DOCUMENT RESUME

ED 457 825 IR 020 895

AUTHOR	Tollett, John R., Ed.
TITLE	Educational Leadership. [SITE 2001 Section].
PUB DATE	2001-03-00
NOTE	115p.; In: Proceedings of Society for Information Technology & Teacher Education International Conference (12th, Orlando, Florida, March 5-10, 2001); see IR 020 890. Figures may contain very small and illegible font.
PUB TYPE	Collected Works - General (020) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	*Computer Uses in Education; *Educational Administration; *Educational Technology; Higher Education; *Instructional Leadership; *Leadership Training; Teacher Education; Technology Integration
IDENTIFIERS	Technology Utilization

ABSTRACT

This document contains the following papers on educational leadership from the SITE (Society for Information Technology & Teacher Education) 2001 conference: "Electronic Curriculum Development and Assessment" (Kevin M. Anderson and Cindy L. Anderson); "The Dilemma of Teacher Training" (Alfred Bork); "Technology and Higher Education Administration" (Ray Braswell and Marcus Childress); "Implementing an Instruction Management System: Final Report" (Ray Cafolla and Perry Schoon); "E3-Learning: More than On-Line Education" (Roger Carlsen and others); "Preparing Educational Leaders To Cultivate the Meaningful Use of Instructional Technology: Beyond Budgets and Basic Training" (Margaret Cassidy); "Leading Academic Change--Through Connective Leadership and Learning" (Manoj Chandra-Handa): "Accountability, Technology, Flexibility: Ensuring Student Success" (Kathryn Floyd and others); "Community Innovations for SITE: Who Is Doing What with Clearinghouses and On-Line Tools Development? (David Gibson and others); "The Role of School Administrators in the Process of Effectively Integrating Educational Technology into School Learning Environments: New Research from the Mid-West" (Ian W. Gibson); "Instructional Technology as a Support System for Principal Certification" (Cathy C. Kaufman); "Managing Change to Flexible Learning Using Online Technologies: Bridges To Cross, Lessons To Learn" (Marie Kavanagh); "Webfolios: Authentically Assessing Prospective Educational Leaders on the Web" (Lori Kim); "Three Roads Diverged and We Took All Three" (Hilarie B. Davis and others); "Software Agents for Distance Education and Institutional Support" (Theresa Lang); "System-Wide Planning for Technology in Teacher Education: Lessons Learned at the University of Wisconsin System" (Dana Nelson); "The Relationship between Leadership, Self-Efficacy, Computer Experience, Attitudes, and Teachers' Implementation of Computers in the Classroom" (David M. Piper and Wenfan Yan); "A Multimedia Design for Leadership Training: From Process to Product" (Hanadi Saleh and Roberta K. Weber); "Models of Technology Leadership in U.S. Schools" (Mary B. Shoffner); "Infusing Technology into Leadership Development" (Helen Sobehart and others); "Move to the Top of the Class: A Comprehensive Technology Staff Development Program" (Connie Swiderski); "The Information Revolution and the Future Role of Educators" (Michael Szabo); "Wanted: A Miracle Worker--A Consideration of Some Issues Arising from the Leadership of Entrepreneurial

Reproductions supplied by EDRS are the best that can be made
from the original document.

Activity in Information and Communications Technology in an Academic Setting" (Lynne Walker); "Emerging Careers in Instructional Technology" (Shirley Waterhouse). Most papers contain references. (MES)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 457 825

IR 020 895

EDUCATIONAL LEADERSHIP

Section Editor:
John R. Tollett, *Northwestern State University of Louisiana*

Twenty-four articles in this section are summarized according to the following topics: (a) Utilizing Technology for Curriculum Management, (b) Utilizing Technology Resources for Leadership Development, and (c) Research and Recommendations for Improving the Utilization of Technology. Summaries are provided in alphabetical order within each topic.

Utilizing Technology for Curriculum Management section focuses on efforts of school districts to incorporate technology in tracking accountability progress. These selections would be excellent articles for K-12 curriculum coordinators and administrators as they consider efforts to improve instruction and assessment.

Anderson and Anderson, National Louis University, provide a chronology of transferring a school district's paper-based curriculum notebook to electronic form. Filemaker Pro database was utilized to manage the curriculum, assessment procedures, and reporting systems. Descriptions of other software are provided to assist teachers with lesson planning and grading.

Cafolle and Schoon, Florida Atlantic University, assisted Palm Beach County, Florida, with the implementation of the Instructional Management System to align the state's required standards to the curriculum, instruction, and assessment. The IMS Series provides teachers with data to measure the students' progress towards achieving state benchmarks and standards.

Cassidy, Adelphi University, questions administrative control over the use of technology by teachers. Effective leadership requires principals to have additional responsibilities as they make decisions in the use of school computers. Pitfalls and recommendations are provided by the author.

Floyd, Moore, Bailey, and Reed provide an interesting blend of perspectives from the state, district, university and corporate worlds in the use of technology to meet accountability requirements. South Dakota provided the technology infrastructure to districts, mandated accountability standards, and provided 2-way audio-video systems to deliver certain subjects on-line. Meanwhile, districts outlined steps in their initiatives to provide electronic tools to aid in curricular planning and student assessment. Ball State University prepares its education majors to use the state adopted software prior to graduation. The corporate perspective encourages teachers, schools, and districts to solicit private funding to implement technology rich accountability software.

Lang promotes software agents as the next evolution following the infosphere of internet, intranet, and the world wide web. Specifically, Lang asserts that the thoughtful application of pedagogical agents can support teachers with the application of pedagogical theory. Adele, an animated pedagogical agent developed at USC, has been used in medical education in the areas of family medicine and geriatric dentistry. This type of technology can address institutional goals using a minimum of resources.

Piper and Yan, Indiana University of Pennsylvania, presents the results of a study of 160 teachers and their use of technology in the classroom. Factor analysis was used for data reduction. Teacher behaviors for predicting the amount of computer use are presented.

Swiderski, Education Service Center Region XI, Texas, presents an innovative approach to staff development. "Move to the top of the class" is a series of on-campus and on-line mini-courses to provide technology skills to teachers. The program description, methods of interaction, methods of instruction, methods of evaluation and implementation are described.

Generally speaking, the **Utilizing Technology Resources for Leadership Development** section would be of particular interest to any higher education instructor or administrator that utilizes or wishes to use technology to improve skills of future school administrators.

Kaufman, Indiana University of Pennsylvania, directs a Principal Certification Program that utilizes individual web pages for students to document internship experiences matching the program objectives. Student experiences in six performance areas are posted on web pages and follow a common template. Web pages are accessible to other students, and provide opportunities for collaborative learning, technology competences, and cohort support.

PERMISSION TO REPRODUCE AND
DISSEMINATE THIS MATERIAL HAS
BEEN GRANTED BY

G.H. Marks

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)

BEST COPY AVAILABLE

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Kim, California State University, Los Angeles, creates webfolios in the first preparation class for the prospective educational leaders. Portfolios used in this project are authentic assessments of leadership skills. The webfolios document school leader training throughout the program. Students and faculty become active partners in the teaching and learning process. Kim summarizes the results of the project and provides recommendations.

Saleh and Weber, Florida Atlantic University, report the use a variety of multimedia produced, simulation modules in their leadership training program. Developed with Authorware, content is delivered via interactive simulations in an educational organization course dealing with administrative theory.

Shoffner, Georgia State University, presents the results from an exploratory national survey on the presence of instructional technology professionals in school settings. State licensure requirements for instructional technology certification are explored with explicit licensure rules the focus of the study. Pros and cons of licensure are also provided.

Sobehart, Tomei, and Armstrong, Duquesne University, founded the Leadership Institute and Interdisciplinary Doctoral Program, to train future superintendents and other school executives. Cohorts of 30 students are admitted every three years. Each student is assigned a practitioner mentor. Systematic use of technology skills, electronic portfolios, distance learning, and electronic curricula are cornerstones of the program.

Walker, University of the West of England, UK, portrays the leadership role in higher education institutions as an "entrepreneurial activity" linked to the e-learning revolution. Lessons learned and issues still to be resolved are stated.

Waterhouse, Embry-Riddle Aeronautic University, profiles needed careers in instructional technology. Also presented are new principal duties and responsibilities to facilitate instructional technology.

The final section groups articles with a common theme of **Research and Recommendations for Improving the Utilization of Technology**. These articles would appeal to those in higher education as well K-12 education interested in the future technology initiatives.

Bork, University of California-Irvine, provides a critique of the failure of teacher inservice efforts and makes two recommendations for alternatives to inservice education.

Braswell, Auburn University-Montgomery, and Childress, Emporia State University, present findings from a study of technology use by university administrators. The perceived use and support of technology at these universities were also provided.

Carlsen, Mathies, Hawley, and Veres, Wright State University, evaluate the development of an on-line course delivered through the WebCT, WebBoard, and Tegrity while both synchronous and asynchronous methods of delivery were used. Social and cultural needs of students were considered in this development.

Chandra-Handa, Knox Grammar School, Australia, suggests a 2-level paradigm shift for leading academic change. One level is in learning and the second is in educational leadership. Learner-centered education for both students and teachers are recommended.

Gibson and McLaughlin, National Interagency Civil-Military Institute, and others provide in an interactive panel discussion addressing the needs for further development of SITE's web sites. Session goals are provided.

Gibson, Wichita State University, examines the role of administrators as instructional leaders in their integration of technology into the learning environment. The author used focus groups to collect qualitative data on the importance of administrative support in utilization of technology.

Kavanagh, University of Queensland, Australia, challenges instructors in universities using internet delivery for courses. The author describes a learning model "reflective of the needs of its learning community." The author touts flexible teaching and learning systems, shifts in university policy relative to the development and delivery of courses, and the process to bring on-line such courses.

Davis, Project Story Teller, and Engelhart and Korth, DIAL Corporation, support inquiry through the co-delivery of ideas by design teams and models the process. WebMaster Institute teams build technical skill, and other design teams combine content and technology into course modules. The program outcome is longevity and sustainability of technology.

Nelson, University of Wisconsin, focuses on the planning effort of the University of Wisconsin System to integrate technology within their teacher preparation programs. Change strategies are explained within the context of the University organization.

Szabo, University of Alberta, presents a set of guidelines to prepare educators for the Instructional Technology revolution. Recommendations are based on a review of current technological and sociological developments with an eye towards the future.

John R. Tollett, EdD is Dean of the College of Education at Northwestern State University of Louisiana. His research and teaching interests include public school finance and school administrator/leadership development. He serves as a facilitator for the La. State Department of Education's Aspiring Leaders Academy and Project LEAD for first year Assistant Principals. He also directs the Leadership Internship Program on-line. His address is College of Education, Northwestern State University, Natchitoches, LA. E-mail: Tollett@nsula.edu

Electronic Curriculum Development and Assessment

Kevin M. Anderson, Ed.D.
Director of Instruction
Kenosha Unified School District No. 1
Kenosha, WI
USA
kevander@kusd.edu

Cindy L. Anderson, Ph.D.
National College of Education
National Louis University
Milwaukee, WI
USA
clanderson@nl.edu

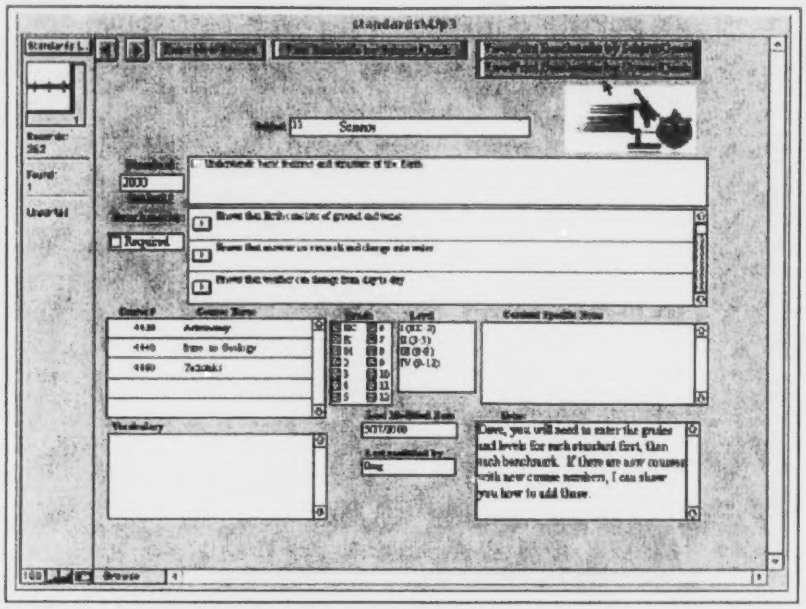
Abstract: This poster demonstration by Kenosha (WI) Schools will show screen shots from a *Filemaker Pro* curriculum database representing the official academic curriculum of the district, provide samples of grade reporting formats using *Easy Grade Pro*, and demonstrate hands-on use of the programs through the use of two laptop computers. Visitors will be able to examine the formats and offer suggestions about future improvements to the system. The intent of this session is to provide K-12 schools and teacher education institutions with a look at how one public school district is developing electronic methods for developing curricula, assessing student performance, and reporting out on standards to parents and the community.

The Kenosha (WI) Unified School District has been working for the past several years to develop a paper-based curriculum notebook for use by teachers in all subject areas. These notebooks contain the standards and benchmarks that are the basis for instruction in the district, a 20, 000 student school system about 30 miles south of Milwaukee, Wisconsin. In addition, the notebooks contain lifelong learning standards, examples of exemplary units, and other supplemental information. These notebooks have now become the official curriculum guides for the district and are available in each classroom and school library for teacher, student, and parent use.

Due to recent advances in the availability of technology for all teachers, over 6,000 computers are now in use by over 1,700 teachers and 20,000 students in the district. The majority of these computers are now connected to the web through T-1 lines, enabling easy and fast access to networked programs and Internet sites. Because of this new accessibility, efforts are underway to produce electronic versions of the curriculum notebook, including assessment procedures and reporting systems to check on progress toward meeting student academic standards. This poster demonstration presents the current work on these electronic curriculum development and reporting programs.

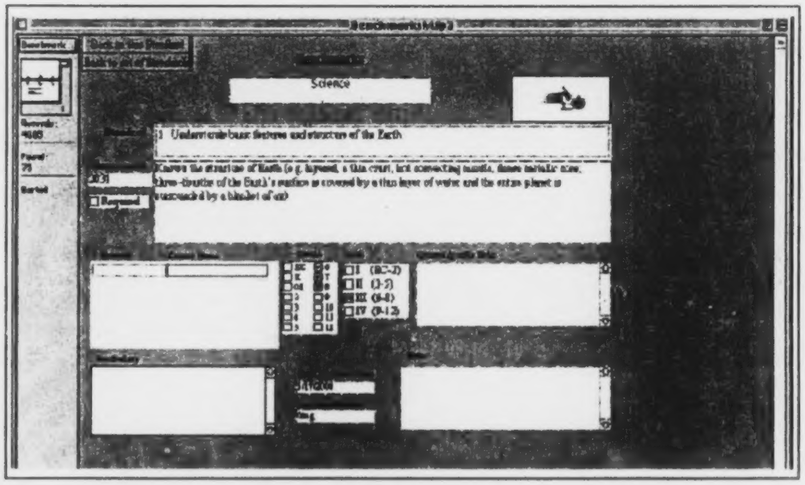
The Kenosha Schools have contracted with the TIES company of Roseville, Minnesota to produce an electronic curriculum notebook using the *Filemaker Pro* database. While the design of the notebook is not completely finished, the potential of using such an electronic curriculum notebook is readily visible. Current plans call for producing both a web-based version of the notebook and a CD-ROM version. These two versions will allow teachers to access the database in their classrooms either on-line or without an Internet hookup. As they design lessons and units, teachers will be able to quickly search for benchmarks, activities, vocabulary words, sample assessments, and suggestions for teaching about the particular skill. The, they will be able to "drag and drop" information from the database into a lesson plan template and create their own customized plans. It is planned to include scanned pictures of required lesson materials, audio clips, and *QuickTime* movies for use by teachers in their lessons.

Figures 1 and 2 below show screenshot of a standard page and a benchmark page in the curriculum database. It should be noted that the vocabulary and content specific notes sections are still blank in this version. These fields are currently being completed by teams of district teachers.



Dave, you will need to enter the grades and levels for each standard first, then each benchmark. If there are new courses with new course numbers, I can show you how to add these.

Figure 1: Screenshot of a standards page in *Filemaker Pro*



1 Understand basic features and structure of the Earth

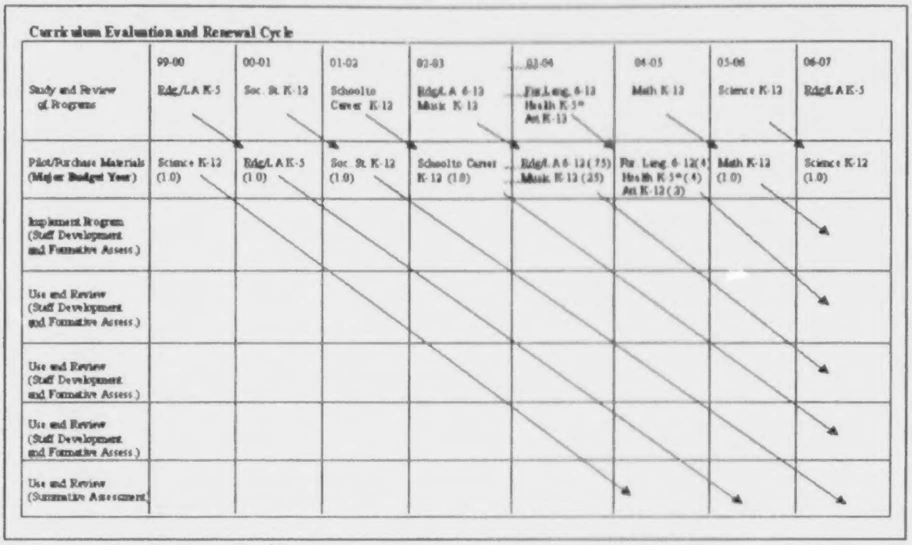
Knows the structure of Earth (e.g. layered, a thin crust, hot convecting mantle, dense metallic core, three-fourths of the Earth's surface is covered by a thin layer of water and the entire planet is surrounded by a blanket of air)

Figure 2: Screenshot of a benchmark page in *Filemaker Pro*

In order to maintain a consistent and accurate database, teachers will only be able to access and use the information without being able to make changes to the database. While entering information will be the responsibility of one or two teacher-consultants or their secretaries in the district's central office, teams of teachers will work together to develop the information about each subject standard and benchmark. In addition,

BEST COPY AVAILABLE

changes to the database will primarily occur when a subject is due for review under the district's curriculum review cycle (Figure 3). This means that major information will be entered for all subjects during the first year, followed by revisions for individual subjects at regularly specified intervals. Plans are to make the CD-ROMs available to subject-area teachers each August with the newly updated benchmarks and materials for their areas. Due to the cost, it will still need to be determined whether to give each teacher an individual copy or to give grade level teams one copy. Teachers having Internet access at school or at home could also work with the database by downloading information and using it for lesson development.



Curriculum Evaluation and Renewal Cycle

	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07
Study and Review of Programs	Rdg/LA K-5	Soc. St. K-12	School to Career K-12	Rdg/LA 6-12 Music K-12	For. Lang. 6-12 Health K-5* Art K-12	Math K-12	Science K-12	Rdg/LA K-5
Pilot/Purchase Materials (Major Budget Year)	Science K-12 (1.0)	Rdg/LA K-5 (1.0)	Soc. St. K-12 (1.0)	School to Career K-12 (1.0)	Rdg/LA 6-12 (.75) Music K-12 (.25)	For. Lang. 6-12 (.4) Health K-5* (.4) Art K-12 (.2)	Math K-12 (1.0)	Science K-12 (1.0)
Implement Program (Staff Development and Formative Assess.)								
Use and Review (Staff Development and Formative Assess.)								
Use and Review (Staff Development and Formative Assess.)								
Use and Review (Staff Development and Formative Assess.)								
Use and Review (Summative Assessment)								

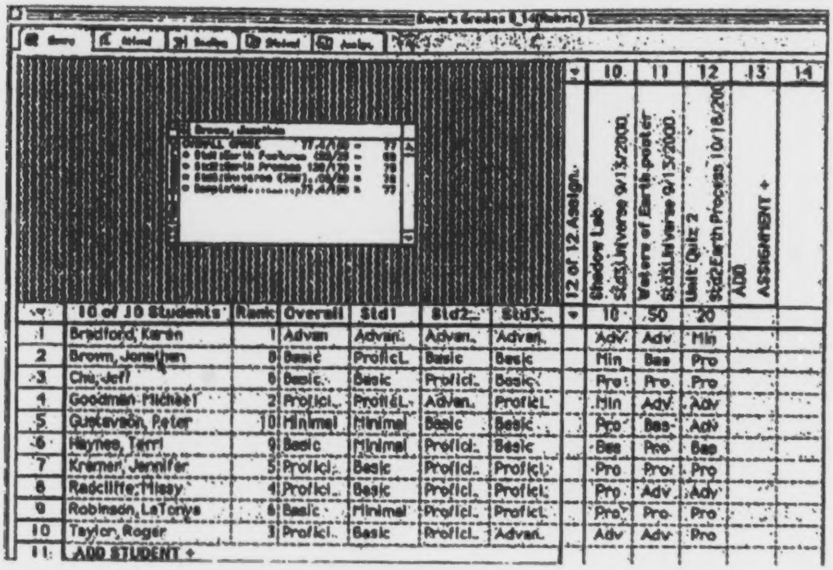
Figure 3: Curriculum Development and Renewal Cycle

In conjunction with the development of the electronic curriculum is the piloting of an electronic gradebook for reporting out on student success with subject standards. The district has made the purchase of *Easy Grade Pro* for all teachers in the district based on earlier pilot studies conducted last year. Previously, some of the teaching staff had used various grading programs for doing grade reporting, but various limitations forced the district to look for a more complete reporting program. *Easy Grade Pro* appears to meet this need. Teams of subject consultants and classroom teachers have been testing the use of this grading program with the district's standards and benchmarks and have found a great deal of support from the users. Figure 4 shows a reporting screen with fictional student scores.

Easy Grade Pro allows teachers to input class lists from several other electronic sources. This facilitates the switchover from the other grading program currently being utilized in the district. Also, grading schemes may be set up as letter grades, pass-fail, rubric scores, and percentages to give several different views of student proficiency. In fact, each student in a class may have a different grading notation or approach to meet the individual needs of diverse learners. Numerous reports and graphs may be generated from these student scores, providing teachers with a myriad of ways to show students and parents about academic progress.

This poster presentation will show screenshots from the various programs, provide samples of reporting formats, and demonstrate hands-on use of the programs. Suggestions will be welcomed about future improvements to the system. The intent of this session is to provide K-12 schools personnel and teacher education faculty with the opportunity to see how one district is developing electronic methods for developing curricula and assessing student performance.

BEST COPY AVAILABLE



▾	10 of 10 Students	Rank	Overall	Std1	Std2...	Std3...	▾	10 Shadow Lab Std3:Universe 9/13/2000	11 Waters of Earth poster Std3:Universe 9/13/2000	12 Unit Quiz 2 Std2:Earth Process 10/18/200	13 ADD ASSIGNMENT +	14
							▾	10	50	20		
1	Bradford, Karen	1	Advan	Advan.	Advan.	Advan.		Adv	Adv	Min		
2	Brown, Jonathan	8	Basic	Proficl.	Basic	Basic		Min	Bas	Pro		
3	Chu, Jeff	6	Basic.	Basic	Proficl.	Basic		Pro	Pro	Pro		
4	Goodman, Michael	2	Proficl.	Proficl.	Advan.	Proficl.		Min	Adv	Adv		
5	Gustavson, Peter	10	Minimal	Minimal	Basic	Basic		Pro	Bas	Adv		
6	Haynes, Terri	9	Basic	Minimal	Proficl.	Basic		Bas	Pro	Bas		
7	Kramer, Jennifer	5	Proficl.	Basic	Proficl.	Proficl.		Pro	Pro	Pro		
8	Radcliffe, Missy	4	Proficl.	Basic	Proficl.	Proficl.		Pro	Adv	Adv		
9	Robinson, LaTonya	6	Basic	Minimal	Proficl.	Proficl.		Pro	Pro	Pro		
10	Taylor, Roger	3	Proficl.	Basic	Proficl.	Advan.		Adv	Adv	Pro		
11	ADD STUDENT +											

Figure 4: Screenshot of a standards-based class score sheet in *Easy Grade Pro*

Easy Grade Pro 3.5. (2001) Orbis Software, Puyallup,WA.

Filemaker Pro 4.0. (1997) Claris Corp., Santa Clara, CA.

QuickTime. (1991-99) Apple Computer, Inc., Cupertino, CA

BEST COPY AVAILABLE

THE DILEMMA OF TEACHER TRANING

Alfred Bork
Educational Technology Center
Information and Computer Science
University of California
Irvine, CA 92697-3425

Introduction

In 1957 the Soviets put up the first earth satellite, Sputnik I. For education in the United States this was a traumatic event. Until that time, many (but not all) people, including the popular press commonly denounced Soviet science as ineffective. The fact that it achieved this major technological development, visible in many parts of the country, before we did led to much trauma about the quality of science education in the United States.

One reaction was a major organized curriculum effort in American education, the major such event in our history, mostly funded by the United States government, It lasted about 15 years. Many of the courses developed cost millions of dollars to produce, so the curriculum efforts were well funded. I would estimate that close to one hundred million dollars were spent in these extensive efforts, more by today's prices. Major individuals participated in their development, including major figures in science and education. The concentration was on the east coast, but it was a nationwide efforts. Books were the most common product, with some production of films and other items.

Some initial efforts were in elementary science, including such major products as the Science Curriculum Improvement Project (often called SCIS) at the University of California, Berkeley, directed by Robert Karplus. A similar project was the Elementary Science Study at MIT. These courses were very different than existing practice at the elementary level, with much more emphasis on the processes of science, and much less emphasis on memory. Mathematics courses followed, also with new approaches.

High school courses were developed, and even a few university courses. I was involved in one of these, the Harvard Project Physics course for secondary school. One project, Man a Course of Study, a fifth grade sociology course, brought this period to an abrupt end, for political reasons. This was a very interesting story, but not relevant to this paper.

Although many of the resulting courses were widely praised by scientists and educators, most of the products were not successful in practical usage. Only the biology courses, produced by the Biological Sciences Curriculum Study group are in common use today.

This well-funded failure led to much agonizing about what went wrong. Some of this thinking appeared earlier, but we are still hearing the reasons for lack of success. Probably everyone, including me, 'knows' why failure happened.

One such reason commonly given for this failure was of considerable importance at the time, and is the primary concern of this paper. Since these new courses were different than older courses, it was believed that teacher training was essential to prepare teachers for this new task. Not only the content was different, but with many of the courses the entire philosophy of what the student and teacher were supposed to do was strange to many teachers, different than their previous training.

A major effort in training teachers in these new courses took place. It is difficult to estimate the funds that went into teacher training for the new courses, since the funding cam from so many sources. I have seen an estimate that teacher training costs for the post-sputnik courses were seven times the cost of development, which would make the total over five hundred million dollars, a huge amount. But mostly the courses were not helped by this large effort. Teacher training was not effective, and most of the major post-sputnik efforts died.

We continue with such efforts in training teachers, for all of education. It is a major part of the educational funding of the National Science Foundation, and other major federal agencies.

Almost every new school movement is matched with a corresponding training activity. But, in spite of occasional glowing reports, it is seldom successful. Training teachers is a common problem with education generally. One might say it is the Achilles heel of education.

An Impossible task

I wish to argue that inservice training for a sufficient number of teachers for new curriculum and learning methods is impossible by present means, and perhaps by any means. It is a myth to believe that we can effectively train enough teachers. I am basing this argument primarily on the United States, but I believe that similar factor apply worldwide.

The central problem is numbers – too many people in this country and on earth. With so many people who need to learn, our current systems for learning employ large numbers of teachers. In the United States there are now about three million teachers in 90,000 schools. We have about 48 million students, of ever greater diversity. But most of our thinking and strategies in these matters is based on older traditions when the numbers were much smaller.

The numbers change everything, in ways that we are only beginning to understand. Others have noted this.

> Sober thought also tells us that any suggestion that some two million teachers be retrained to change what they do in classrooms must be called wishful.
>
> Leslie Hart
> Human Brain and Human Learning
> 1983

We still spend enormous sums on inservice teacher training. Whenever something does not work, it is the recommended solution, just as with post-sputnik development. Major organizations, both nationally and in the states, support this approach.

Currently teacher training is being heavily touted for the use of the Internet in classes, as it becomes clear that Internet connections in all schools often do not lead to improved learning. An article in the New York Times of July 3, 2000, reports that 95% of schools in the United States now have Internet connections. Once more, the cry in this article and in many other places is that we should train the teachers. One more, the teacher training is not necessarily appropriate. A friend, about to get ten computers in her class, is in a course to prepare for this that is teaching her about bits and motherboards!

The results of teacher training are very variable. Some teacher programs turn out to be very effective, but this is a small number. As with much of education, we look for success and try to imitate it. But these good examples often depend on the existence of special situations, such as a very superior teacher involved in the training, nor duplicable elsewhere.

Often the teachers are thrown in different directions every few years in these training programs. Several years ago California elementary teachers were told that they should integrate all subjects by establishing a common 'theme' for all areas. A friend chose 'trails' as her theme. But this approach was quickly downplayed. Teachers are tossed around with little consistency from year to year, making a difficult task even more difficult.

This variation is particularly bad with the critical elementary areas of reading and mathematics in the elementary grades, where the battle for different approaches has gone on for a long time. The pendulum often swings, although it would seem that research could settle the issue.

One approach that has been tried many times is the 'trickle down' approach, with a variety of names. It recognizes that we cannot reach all teachers directly. The idea is that we will train a few teachers, and they will train other teachers at their schools. This may proceed for many generations. I was involved with one such effort involving educational technology for a school district in southern California. I had a chance to talk to teachers in the third generation, after I had run the first generation. I could find almost no relation between the two generations; nothing I did survived. I know of no large-scale evidence that the trickle down method works. It does not work as a method for reaching effectively large numbers of teachers.

Such efforts are generally poorly evaluated, with regard to their long-range effects in improving learning. This is a common problem in many areas of learning, even though some agencies insist on built-in evaluation as part of the project.

Although the sums spent in this direction are very large, they never are enough to reach all teachers. We can wonder if they will ever be enough, given the numbers of teachers we are now faced with. It seems unlikely. So teacher education is a dilemma: We need it, but we cannot afford it. The situation is much worse in the poor parts of the world.

The pattern is as follows:

1. We develop new curriculum, new ideas for improving learning.
2. These do not work
3. The suggested solution is to train the teachers.
4. This does not work.

SOLUTIONS TO THIS PROBLEM

Given that current methods of addressing the problems of inservice teacher training are inadequate, how do we proceed. There appear to me to be two ways out of this dilemma, both making effective use of the computer. Both are expensive at the beginning, but have possibilities for greatly reducing the long-term costs of learning. Both involve bold new directions, with little current experience, so both involve possible risks. They need major experimental efforts to demonstrate their effectiveness or lack of effectiveness. I see no other possibilities, but I welcome other ideas.

These two suggestions are related, in that they both involve expensive use of carefully prepared computer-based learning material. In the first case teachers are the learners. In the second the students are the learners. In both, distance learning is a natural delivery method. In both, the highly interactive units would adapt to the individual user. In both the learning material could be used anywhere at any time. One involves tutorial computer-based units for teachers, and one computer-based tutorial units for students.

1. Teacher training via interactive computer material

Several years ago we made several unsuccessful efforts to obtain funding for computer-based learning units for teacher education in educational technology. Just before this we had conducted at Irvine an expensive training session of this kind, taught in a conventional fashion, funded by the state of California. I did not think it was too effective, in spite of high costs. A quick calculation suggested that this was far too expensive to scale to all teachers in the state, the country, or the world, if we brought all these teachers to Irvine. Further, the manpower to do this for all teachers would not be available. Hence I planned the proposals to do all this through the computer.

Such an approach does not need to be training in educational technology, although it was natural because computers will be required because of the subject matter. It could be done in any area.

Since the second suggestion also involves computer-based learning, I will postpone the discussion of the details of computer-based tutorial learning units, including how such material is developed.

2. Computer-based tutorial learning for students

The second approach, students learning through interactive computer material, is a much more radical approach to teacher training, because it removes the need for most special training of the teachers. It is based on the possibility of distance learning, both in schools and informal environments, using a new form of learning material. It would require a radical change in learning, compared to our current situation.

It would allow, after sufficient learning material is developed, far fewer teachers than we now need. So the educational systems would be very different than those today. Learning would be tutorial.

As with the first suggestion, almost no material of this kind exists at present. In the next section the notion of tutorial computer-based learning is developed further.

TUTORIAL LEARNING FOR TODAY

Tutorial learning with human tutors has a long history, but because of the expense involved it has always been used with a limited number of students. A skilled tutor works with one or several students. This situation does not resemble a lecture in any way. Often, as in the case of Socrates, the tutor proceeds by asking questions. With good tutors this approach has proved to be a very successful learning strategy, with students of all ages.

But tutorial learning with human tutors is far too costly to be possible for all learning, and we could never find enough tutors for our large populations today. But it is possible and practical if the computer can serve the role of the tutor. We have been developing such computer-based tutorial units, on a small scale, for over thirty years at the Educational Technology Center at the Universty of California, Irvine. It requires no technology or learning approaches beyond that available today.

Here are the critical features of such learning modules.

1. A very high degree of interaction

Tutorial learning is active learning, student centered. Although computer material is frequently called interactive, to achieve the tutorial focus, we need a higher degree of student-computer interaction than is commonly found today. Interaction refers both to the frequency of interaction, and the quality of each interaction, as discussed in the next two sections.

One important consequence of active tutorial learning is that students can discover much of their knowledge rather than being told it. Examples will be given later.

2. No long speeches on the part of the computer

Frequent interaction means that the time between two student inputs should be short. Our testing in public libraries shows that the maximum interval between two student inputs should be no longer than twenty seconds.

This implies that computer and student "speeches" should be limited, as in human dialogs. So we do not want in interactive material long pages of text, as in most Web sites today, or long video sequences. The interaction should resemble a conversation, not a series of long essays.

3. Use students' natural languages for interaction

The highest quality of interaction between two humans comes from our natural languages, perhaps the most powerful of all human tools. We seldom use pointing and multiple choice for human communication, so it should not be used with computers, a radical departure from today. This use of languages should be in both directions, student and computer.

Student input should be in the free-form natural language of the student. Thus the student might reply to a question from the computer or ask a question, in English or in another language.

Until recently this was possible only through typing. Now reasonable voice input is possible, with commercial available inexpensive speech recognition engines. Speaking is much more natural for humans than typing. With very young children it is the only approach possible.

4. Seek and help with individual student problems

A key to learning with tutors is that the tutor is constantly seeking student learning difficulties. The tutor needs to understand what problems are likely in each situation, and to find ways, usually through asking questions or giving problems to solve, to determine just what difficulties are to be found at each moment in learning.

This is the principle pedagogical purpose of the frequent and high quality interactions just mentioned. Once such difficulty is located, the tutor proceeds to assist the student, checking to see if this assistance was effective. This is a continuing frequent activity in leaning with tutors.

Another way of viewing this helping process is that assessment is intrinsic to the learning material, occurring frequently and indistinguishable from learning. Its purpose is to decide what learning material is required next. The student is not aware of taking tests.

5. Assure mastery for all learners

This frequent mediation for student learning problems can be continued until all students learn the material fully, to the mastery level. Benjamin Bloom and his students showed that mastery is possible with tutorial learning, in extensive experiments in the Chicago public schools. Several different learning sequences might be necessary, as not all students learn in the same way.

Since all learners succeed, we can have a much more positive view of learning, encouraging lifelong learning.

6. Anywhere, Anytime, all students

Presently we could reach very large numbers, with CD ROM or the Internet, with such learning material, assuming computers are available to the students. In the near future, with satellites, special inexpensive computers, and solar powered computers, we can expect to reach almost everyone on earth.

With distance learning the students can be anywhere. Learning can start and end at any time, with computers maintaining the records. Students can proceed at their own paces.

7. Distance learning

Although tutorial learning modules could be used in traditional schools, universities, and training centers, most of the future use would reach people wherever they are. Students might be in homes, libraries, shopping centers, community centers, museums of various types, or in specially build learning facilities. They could be sitting on a swing in a yard, on the beach, or in the middle of a field of poppies. Distance learning liberates us from particular learning locations.

Distance learning should be in a form that can reach very large numbers of students.

8. Peer learning

A valuable learning approach involves students helping each other. Learning circles can be established either locally, or remotely electronically. Student records stored by the computer will assist this process.

9. Intrinsic motivation

As students involved in distance learning will not be subject to the pressures and threats of standard classes, the learning materials must keep students interested in learning. Since everyone succeeds, the experience of learning can be enjoyable for all.

Learning modules must be intrinsically motivating, keeping students at difficult tasks. A high degree of interaction will be of major help here, as active learning keeps students involved. Other motivational approaches may be useful in holding attention, but the focus should be on learning rather than entertainment.

An important part of formative evaluation, part of the development process, will be to verify that the student's attention is maintained for long periods. In testing units in informal environments like shopping centers, where students are under no pressures to continue except their interests, we can record where many students leave the program, and rework such sections until they are motivationally strong.

10.Very large numbers of students

Our world now has six billion people. So educational activities need to look toward very large audiences, many cultures, and various languages. Types of distance learning suitable for groups of twenty or thirty, increasingly common in United States universities, will not be adequate to the needs of our society.

Since very large numbers of people would be involved, the units would need to work without teachers, as well as with teachers.

IS SUCH LEARNING MATERIAL POSSIBLE?

The picture presented for tutorial computer-based learning is very different than most learning today. To some it will appear, I am afraid, as a fantasy. But I believe it is a realistic possibility for the near future. I begin with examples of such material from the Educational Technology Center at the University of California, Irvine.

As mentioned, we have been developing tutorial material for over thirty years, with mostly much more primitive equipment than now available. An example is the Scientific Reasoning Series, developed about a dozen years ago. There are, in the form sold by the IBM K-12 group, twenty hours of student material. Other material developed was not marketed commercially.

Examples from this Series can serve to illustrate the possibilities for tutorial computer-based learning. In one, a program called Heat, the aim is to have all students invent the scientific concept of heat, starting with everyday knowledge about temperature. The program begins immediately asking the student how she or he measures his own temperature, and waits for a free-form answer. The student may need to be prompted if she or he does not answer in a reasonable time. The program continues in this questioning form for about one hour, one of the shorter programs in the Scientific Reasoning Series.

Other examples from the series show the possibilities of students discovering their own knowledge. One example is Families. The aim is to have students discover important scientific laws, Mendelian laws of genetics. The student makes experiments with imaginary animals, Nors. The computer is always watching what the student does, and offers advise only when necessary. All students discover these important laws. This is one of the most difficult programs in the Series, taking about two hours for a typical student.

In another program students discover the simple laws of electrical circuits, such as the need to have a closed circuit to light a bulb. This program is based on modules developed in the elementary science projects in the post-sputnik development. They do not use equipment at the display, but students are urged to do this on their own.

I remind the reader again that these were done many years ago on computers with far less capability than contemporary computers.

DEVELOPING TUTORIAL LEARNING MODULES

I will not discuss in full detail how such units are developed. The system we use was developed beginning thirty years ago at the University of California, Irvine, and the computer science group at the University of Geneva, in Switzerland, joined with us about ten years ago.

Creating tutorial learning requires a different development strategy than is common today. Four stages are involved, management, design, implementation, and evaluation. The designers are very good teachers in the area involved, working in groups of about four. They do only the design, they do not program, for example.

Further details can be found in the Irvine-Geneva paper at the Web site mentioned at the end of this paper. Other papers there also describe the development process.

COSTS FOR TUTORIAL LEARNING

The cost of learning needs careful consideration. Learning must be affordable for all. The cost for an hour of student learning is the most important figure.

At least three factors are involved in determining costs, the cost of development, the cost of delivery, and the cost of the management structure.

1. Development costs

In the post-sputnik development mentioned at the beginning of this paper, a course cost millions of dollars. A course at the United Kingdom Open University costs a similar sum to develop. Most recent development in the United States, such as the Web-based university courses, costs much less, but one can raise questions about quality of these passive courses. The computer-based learning literature is full of useless statements that it takes three hundred or so hours of time to produce one hour of student time, again a low figure for quality material, and not a reasonable way to approach the costs of development..

Development is not the whole ball of wax, so considering this alone in computing costs is very misleading. The Open University has long demonstrated that expensive development of quality material can lead to low costs per student.

2. Delivery costs

Conventional university courses have little development costs, but high delivery costs, because of the salaries of professors. Self-study such as reading a book has a low delivery cost.

An interesting factor in delivery costs is the number of students who can learn with the approach used. With some kinds of learning, delivery costs increase with the number of students, but another possibility is that they decline.

Management costs

In a conventional school these include all the administrators, often a considerable number, and all the record keeping. With computer-based distance learning the computer maintains all the records and does the administrative work, at a low cost per student.

Tutorial distance learning can reach large numbers of students, with low costs per student. With large numbers, expensive development is coupled with low delivery costs.

BACK TO TEACHER TRAINING

After this interlude to discuss tutorial computer-based learning we return to the problems with teacher training. I suggested two ways out of the dilemma presented by to typical failure of teacher training, computer-based learning for teachers, and computer based learning for students.

We should try both of these approaches. It may be that both will be needed, at least in the immediate future.

Careful research

Conduct extensive longitudinal studies on the results

REFERENCES

Additional information is at http://www.ics.uci.edu/~bork .

Technology and Higher Education Administration

Ray Braswell
School of Education
Auburn University Montgomery, Alabama USA
Email: rayb@edla.aum.edu

Marcus Childress
The Teachers College
Emporia State University, Kansas USA
Email: childrem@emporia.edu

Abstract: This paper reports the findings of a study on the use of technology by administrators at two universities. Instrumentation included a survey and interviews which investigated various factors (including time spent using technology, types of technology used, how administrators used technology in any classes in which they were teaching, and their awareness of how university faculty are using technology.

Introduction

Throughout the country, universities are implementing plans to integrate new technologies and teaching/learning strategies into their classes. As a part of these plans, they are developing computer/technology competencies for their students, as well as for their faculty members (Algozzine et. al, 1999). Faculty are asked to not only integrate technology into their content, but into their teaching methods, research agendas, and daily routines. Several universities and colleges are now concentrating on the task of designing and developing technology competencies for their faculty members (Hill & Somers, 1996). As university campuses become more technology-intensive and courses use more technology, we are finding that many faculty members require and request training in using various technologies. To assure that their faculty can meet competencies, many universities offer workshops, training sessions and one-on-one mentoring. These 'faculty development institutes' provide much needed skills which help faculty to attain these competencies. Accrediting bodies such as NCATE are also emphasizing the importance technology, "NCATE standards now expect its accredited schools of education to provide adequate access to computers and other technologies, and expect faculty and students to be able to use it successfully (NCATE, 2000)." On a whole, many university faculty members have answered this call for increased technology use by improving their technology skills and demonstrating those skills in their teaching methods. But, how are university administrators improving their computer/technology skills? And, what are they doing? What, if any, competencies might be needed? This paper will attempt to answer some of those questions and hopefully shed light on the use of technology by university administrators.

Survey and Interview Process

In this study, administrators from two universities (Auburn University Montgomery and Emporia State University) were given a survey and were interviewed about their daily technology use. Interviewees included department/division chairs, deans, associate deans, assistant deans, and vice-presidents. In addition to a survey on technology use, the researchers used a questioning protocol which included open-ended queries regarding technology use in 1) daily administrative duties, 2) teaching duties, 3) class scheduling and student record-keeping, 4) awareness of faculty use, and 5) faculty training needs. Results from the surveys and the interviews were then compiled and categorized, resulting in the findings below.

Findings

Interviews showed that administrators at both universities used various technologies in both their work and their classes. However, the use of the technologies was often dictated by various administrative duties. For example, administrators at one university were using Banner to access administrative records, including class scheduling and student records. Administrators at another university were using a UNIX-based system to access the information needed for administrative duties. Almost all of the administrators surveyed at both universities were using standard productivity software (such as word processing and e-mail) during their daily duties. It was found that the administrators had access to the Internet and most used the Internet at least one time each day.

The researchers also found that administrators who were teaching used a wide variety of technologies. Web-based instruction was being used by some of the administrators. For example, several of the administrators at one university were using WebCT as part of their coursework, either incorporated into the regular classwork or as a method of offering their courses on-line. Most of the administrators at both universities who taught classes were using software such as PowerPoint as part of their use of technology in their classes. However, the use of technologies by administrators who taught classes was sometimes limited by the scope and number of classes taught by the administrators. These administrators were usually teaching a class load which reflected their duties as both teachers and administrators. Very few of the administrators regularly taught classes in a computer lab where all of the students had access to computers. Instead, they included computer lab time in their classes, when appropriate. For example, one administrator taught a health and nutrition class and brought her class to the computer lab to demonstrate how to use the MacDine program (a nutrition-based program). Students then used the program as part of their normal class assignments.

Administrators at both universities were exceptionally aware of how their faculty members were using technology. This awareness is partly driven by the emphasis on technology use by accrediting bodies. The administrators see the need for further faculty training and are addressing this need by creating training opportunities and faculty training institutes. Some of these institutes are delivered campus-wide, while others are contained with colleges and departments/divisions. Although faculty needs are being addressed, administrators' technology training needs seem to be neglected. Unfortunately, many administrators feel as though they are falling behind their faculty in technology skills and use. In order for administrators to lead their faculty into the 21st century with new technologies and teaching paradigms, they must identify their own technological skills and address those needs with training, just as they have addressed the needs of their own faculty.

References

Algozzine, B., Bateman, L.R., Flowers, C.P., Gretes, J.A., Hughes, C.D., & Lambert, R. (1999). *Developing technology competencies in a college of education.* Current Issues in Education [Online], 2(3). Available: http://cie.edu.asu.edu/volume2/number3/

Hill, R.B., & Somers, J.A. (1996). *A process for initiating change: Developing technology goals for a college of education.* Journal of Teacher Education, 47, 300-306.

NCATE (2000). *Major themes of NCATE standards* [Online]. Available: http://www.ncate.org/accred/initial/themes.htm

Implementing an Instructional Management System: Final Report

Dr. Ray Cafolla, Florida Atlantic University, Educational Technology and Research, USA, cafolla@fau.edu
Dr. Perry Schoon, Florida Atlantic University, Educational Technology and Research, USA, pschoon@fau.edu

Abstract The national trend toward the use of high-stakes testing to make schools accountable for the standards students have mastered has forced school districts to take steps to ensure that the curriculum taught in the schools is based upon the standards the students will be tested on. This paper discusses the results of implementing a sophisticated Instructional Management System (IMS) to help accomplish this task. IMSeries is a sophisticated relational database that was implemented to change the paradigm of how teachers think about the lesson planning process. Rather than concentrating on what the students will do, this project encouraged teachers to begin by thinking about what the students will learn. By using this system, teachers were able to track which standards were mastered by each of their students and design their lessons based on individual students' needs. This paper presents an overview of this three year project in the hope that the lessons learned will be beneficial to other districts interested in exploring the use of computer systems to support instructional decision making.

Introduction

In the fall of 1997, the School District of Palm Beach County was awarded a Goals 2000 Professional Development grant. A major part of this grant was to select and implement an instructional management system (IMS) to help align the district's curriculum to Florida's Sunshine State Standards. The process of selecting the IMS has been reported in detail both at the International Conference of the Society for Information Technology (Elias, Cafolla, and Schoon, 1998) and in the Journal of Technology and Teacher Education (Elias, Cafolla, and Schoon, 2000). The purpose of this paper will be to present an overview of the final results of this three year project. Given the expense and time spent in selecting and implementing a sophisticated IMS, we feel it important to share the lessons we learned with others that might be considering similar systems.

Background

The nation school reform movement has focused on the use of high-stakes testing to ensure that students have mastered minimum performance standards. In Florida, the standards are called the Sunshine State Standards (SSS) and are measured by the Florida Comprehensive Assessment Test (FCAT). Like all of Florida's school districts, Palm Beach was required by the State to align its curriculum with these standards. To accomplish this task, school district staff led by the Office of School Improvement decided to investigate the use of a technology based Instructional Management System (IMS).

As educational institutions attempt to restructure and redesign the school and its' culture, they need a means of unobtrusively, continuously, and automatically gathering information and making it available to various decision makers. Data such as attendance, schedules, curriculum, assessments, resources, grades and performance evaluations are needed on a daily, monthly, and annual basis. The importance of the information generated and how it how it is used to support instructional decision making is obvious.

The vision of the Palm Beach school district was to develop a technological infrastructure with the ability to support genuine change in the way that teachers thought about teaching. A system that could serve as a means of revitalizing the process of continuous school improvement. The district applied for and received a Goals 2000 grant to engage in an effort to bring about significant school improvement by using technology in "...the acquisition and use of information for data-based decision making, Information Management Systems (IMS's) are of fundamental importance..." (Carter, 1997). Carter goes on to state "It is necessary to put the curriculum "on-line" in order to address adequately the close monitoring and reporting of student progress and performance against outcomes" (Carter, 1997). The District's goal was to select a system that was "...designed to align the Sunshine State Standards, curriculum, instruction, and assessment to address individual needs of the students and track their progress achieving the Sunshine State Standards." (Cartlidge, 1998).

To identify an appropriate management system, the school district formed a Design Team charged with the responsibility of identifying, evaluating, and testing various systems. In addition to Palm Beach district personal from the Office of School Improvement and the participating schools, the Design Team had consultants from Florida Atlantic University and the Area Center for Educational Enhancement. As noted above, the identification, evaluation, and selection of the management system IMSeries have been reported elsewhere (Elias, Cafolla, and Schoon, 1998; Elias, Cafolla, and Schoon, 2000).

Professional Development

One of the major components in implementing the IMS was concerned with preparing teachers to use the system to make instructional decisions. This training had several components. The first was the challenge of teaching the participants how to use the software. While all of the participants had some computer skills prior to being accepted into program, IMSeries is a complex relational database that requires several days of training to use.

More important than simply learning the software was changing the way teachers think about lesson planning. From the work done for this project and a similar project, the importance of linking outcomes to assessments eventually became clear. With the implementation of IMSeries at each school, it became obvious that the teachers desperately needed continuous, on-going staff development on unit and curriculum design in addition to IMS training in order to input meaningful activities, assessments, questions, etc. into the IMSERIES database and more importantly to align the curriculum with the Sunshine State Standards. Most of the participants still centered lesson planning around the activities the students would engage in. In the new paradigm, the teachers had to be taught to begin with the Florida Sunshine State standards that would be covered. Participants had to learn to begin by using IMS to determine which objectives needed to be taught. Numerous professional staff development sessions were thus organized to provide the curriculum training.

Understanding the instructional design process was the single most important component of this project. The implementation of an Instructional Management System may have resulted in no significant changes in student performance if not for a systematic change in the process by which faculty created and delivered instruction. Data from the study suggest that the project did not effectively begin to meet its' goals until curriculum design became the number one focus. The approach is currently changing from activity-based instruction to standards-based instruction. As one project teacher stated, "This project has changed my way of thinking 180 degrees. I have become more creative and thorough. By being trained to use the instructional management system, I now approach my unit design from the standards and benchmarks first and then I decide on the activities to meet those benchmarks."

Summary of Implementation Accomplishments

During the project, 84 units meeting the curriculum design criteria were developed by project partners. Fifteen of the units came from teachers at the three pilot schools, while the other 69 came from District curriculum writing teams during the summers. In addition, 57 additional units were created by university students. The total units to date that meet the curriculum design specifications are 141. However, individual pilot teachers also have units under development in the schools' databases. The databases at the individual schools contain the work that the pilot teachers completed during the project. A summary of the units by school is listed in Table 1.

Table 1
Instructional units by Pilot School

School	Completed Units	Units under Development	Assessments
Glades Central High	49	276	16
Lake Shore Middle	13	80	4
Pioneer Park Elementary		147	165

Impact

Implementing an IMS served as an impetus to changing teacher paradigms in curriculum design based on aligning standards and benchmarks to assessments and then selecting instructional activities to serve as the vehicle to reach those standards. As a result of the project, various instructional departments began to address curriculum design from a different perspective. Teachers are now learning to make instructional decisions based on what they want students to know and be able to do based on standards and benchmarks.
IMSeries provides teachers not only with a way of measuring whether students have achieved objective, but also get a sense of how they got there.

This project has also been an impetus for curriculum unit design at the university level. Several district staff members also serve as adjunct faculty at Florida Atlantic University and Nova Southeastern University. The curriculum unit design based on IMSeries has been the focus of their instruction in multiple content courses. Students producing curriculum units for coursework are teachers in Palm Beach County and those units are being prepared for Internet access.

Adapting IMSeries challenged district paradigms on data collection procedures and methodology. Before IMSeries was implemented, no elementary school in the district had the capacity to receive data from the mainframe. Data from the PC environment were not permitted to exchange data with the mainframe to prevent data corruption. This project set up and tested a new FTP procedure to allow attendance data to be exchanged between the schools and the district. The school district is implementing this new procedure district-wide. This has had a positive impact on the IMSeries project since the mainframe to school data transfer has reduced time and efforts for several offices.

Conclusion

This project began with the goal of using an instructional management system to gather, manage, and analyze crucial school district data. However, everyone involved with this project has discovered that an instructional management system can be much more than just a software system to manage information. It could turn out to be a major vehicle for changing and improving how teachers plan and assess curriculum, as it has been in Palm Beach County. The potential of this system is tremendous.

The challenge of high-stakes testing has made it incumbent on school districts to ensure that the curriculum that is actually taught in the schools is aligned with the standards the students will be tested on. The age of accountability is full upon us and, like it or not, schools, teachers and school districts will be judged based on student performance. Given thousands of students and hundreds of educational standards, making sure that each student has mastered each standard is daunting- for humans. For computers, however, it's simply a data base problem. Private businesses have used Management Information Systems to provide data to support decision-making. It is time for schools to begin using these types of systems to support making educational decisions.

References

Carter, D. (1997). Information management for site based decision making in school improvement and change. International Journal of Education Reform. 6, 174-188.

Cartlidge, L. (1998). Goals 2000 professional development technology continuation grant-application. West Palm Beach, FL: School District of Palm Beach County.

Elias, J., Cafolla, R., & Schoon, P. (2000). Selecting and Instructional Management System, Journal of Technology and Teacher Education, 8(2), 123-132.

Elias, J., Cafolla, R. Schoon, P. (1999), Selecting an Instructional Management System, 10th Annual International Conference of the Society for Information Technology and Teacher Education, April.

E3-Learning: More Than On-line Education

Roger "Bucky" Carlsen
Wright State University
United States
roger.carlsen@wright.edu

Bonnie Mathies
Wright State University
United States
bonnie.mathies@wright.edu

Steve Hawley
Wright State University
United States
Steve.Hawley@wright.edu

Maggie Veres
Wright State University
United States
rveres@rr.com

Abstract: This paper describes the decisions and procedures that occurred when a traditional graduate level technology course was moved from the classroom lab setting to a partially on-line course with web enhancements. What we developed was an expansion of our initial plan and something quite different, far more complex, and more labor intensive. We knew that if we wanted schools to be different, we must prepare teachers differently ... significantly differently (Carroll, 2000). Our web enhancement efforts quickly triggered the development of an on-line educational support hub and the establishment of several on-line communities. Our on-line hub "E^3-Learning" quickly expanded to provide resources and discussion boards for faculty, students, along with technology directors, library and media directors, and classroom teachers from 35 school districts. Within six weeks of the decision to initially "take one course on-line" the enhancement site e3-learning agreed to provide statewide technology standards discussion boards for 13 participating universities, Ohio SchoolNet, Ohio Board of Regents, and the Ohio Board of Education.

The Project

Project E^3-Learning was receptive to developing a new educational model and delivery system, but it was not predicated on developing a new model. Initially we sought to simply use WebCT to offer a single on-line course. This, however, was not an idea we embraced for long. Instead, the goal of E^3-Learning became the incorporation of wish list items from students and faculty. Two years of archived student input along with current student information, and faculty-generated information was used to identify on-line course content. Where programmatic integrity was not endangered and where technology made a component inclusion possible, wish items were included.

Not all courses and not all course components can be brought to the web easily or effectively (Kelly & Masie, 2000). Thus only for items and in areas where we determined that we could succeed did we initially develop course modules. These modules were based on the ideas and desires of individuals who collaborated with us by using a WebBoard™ and by reviewing successful and unsuccessful on-line and distance education offerings.

Content and modules were made using WebCT™, WebBoard™, and Tegrity™ media equipment and Macromedia and Microsoft software. We were aware of some aspects of a web-enhanced course. In addition to well noted aspects of the web (anytime - any place education, and extended classroom content) we also decided to leverage the unique and frequently less considered properties of the web. We therefore decided to incorporate social and cultural needs of our students (Kim, 2000).

A "readiness test" was developed and administered to students desiring to enroll in one section of a technology in education course. Students not deemed "ready" to enroll in the on-line section were permitted to enroll in one of three traditional sections of the course. Each Instructor received WebCT training during the two quarters prior to offering the on-line course.

Initial Findings

Student Input. Student requests were quickly considered and either identified for eventual incorporation or deletion in the E3-learning program. Students with e-learning experiences do not like some traditional aspects of e-learning. Students stated that e-learning is basically linear education requiring substantially more reading with the submission of considerable written work. Although students knew that sometimes e-learning consisted of chat rooms and discussion boards, they were not enthusiastic about what they described as tedious and uninteresting participation." These findings were consistent with Kim's (2000) presentations. Likewise, those students who had experienced prior e-mail and listserve activities expressed displeasure them, especially when one participated in multiple e-learning courses. Students who responded anonymously reported that they were extremely dissatisfied with a prior on-line learning experience. They, however, reported, that they would not complain because "it was and easy credit."

Students reported that they wanted 1) an incorporation of interactive social and cultural components, 2) the possibility to partake in synchronous and/or asynchronous sessions, 3) to complete their work on computers that were in their classrooms or in their home (e.g., the same operating system and version of application), 4) time shifting and distance education (less driving time), 5) smaller modules that would permit them to establish a "content load" that would juxtapose with shorter units of available time, 6) online technical and academic support available at least daily during week-days, 7) self checks built into modules, and 8) tracking of WebCT activities.

Faculty Input. The initial class session of the course will be held in a traditional fashion. At the conclusion of the course all students were required to meet with a faculty member. A portfolio was submitted. In addition, follow-up questions and student responses were videotaped. In addition to posting papers, students were required to participate in online discussions. Students were also required to complete a computer skills check sheet. On this questionnaire, they identified their current level of performance and identified a skill level. Satisfactory levels of performance were "ability to model best practice" and/or "employ this application in my teaching". Each section of the questionnaire also consisted of a narrative section. All students were required to maintain a record or their statement and submit an example for the final portfolio. These were then used as queries during each student's oral examination. Faculty anticipate that the exit evaluation will be time consuming. We also know that this model will change over time.

E3-learning enhancement webpage. One faculty member had for two years (at another university) maintained and customized web content for his students. When he joined the faculty at WSU it became apparent that his personal web page was highly regarded by his students and others. While teaching a course load of 44 students during the first term, his web page recorded almost 19,000 visitors and downloaded over 40 megabytes of data per month. This became the template for the E3-learning.wright.edu web site. One graduate student and two undergraduate student workers are currently assigned to assist on this project.

Conclusions

Carrol (2000) artfully describes the concept and appropriate place for disruptive technology in education. We agree that if one enters into the pursuit of educational technology excellence one can well experience a disruptive event. With the "right" colleagues, disruption technology can be quite enjoyable. Tom Peters (2000) recently presented several thoughts one of which we will adhere to as we develop our programs. One of our favorites is

> 1965- 1980 was Ready, Aim, Fire;
> 1980 – 1995 was Ready, Fire, Aim;
> 1995 - ???? is Fire, Fire, Fire.
>
> John Roth's "Rules" [Nortel]

Figure 1

References

Carroll, T. G. (2000). If we didn't have the schools we have today, would we create the schools we have today? *Contemporary Issues in Technology and Teacher Education*, 1 (1).

Kelly, K and Masie, E. (2000) Conversations with Kevin Kelly and Elliott Masie: E-learning Update and Perspectives. TechLearn 2000.

Kim, A. J. (2000) Community Building: Secret Strategies for successful Online Communities. PeachPit Press. Berkeley, CA.

Peters T. (2000) Distinct of Extinct. The World eLearning Congress, Orlando, November 30.

Preparing Educational Leaders to Cultivate the Meaningful Use of Instructional Technology: Beyond Budgets and Basic Training

Margaret Cassidy
Adelphi University
Communications Department
Blodgett Hall, NY 11530
cassidym@panther.adelphi.edu

Abstract: Bringing new technology into schools is a complex, challenging process for teachers and administrators alike. There is an overwhelming volume of literature on issues like selecting hardware and software, planning budgets, and providing teachers with the basic technology training they need to get started. However, effective leadership requires a sophisticated knowledge of, and sensitivity to, a myriad of other issues, such as the privacy and First Amendment rights of teachers and students, the problem of unequal student access to technology in school and at home, and the proper role of commercial and corporate entities in public schools. This paper will explore these issues, and suggest that educational leaders consider them in their day-to-day decisionmaking.

Introduction

I recently made a visit to a friend who is an elementary school principal. We met for approximately two hours one morning, during which time we discussed a variety of issues concerning the effective and appropriate integration of new technology into elementary education; we also took a walk around the school and chatted with some teachers about what has and has not worked well for them as they have tried to "technologize" their teaching. All in all, it was a very interesting morning for both of us. However, the time was not without its problems. At one point, my friend realized he had an assembly to introduce, grabbed his suit jacket, and tore off to the auditorium in the nick of time. Later, a teacher stopped by to ask for something he had promised her, and he realized he had forgotten to do what he had promised. Then a problem with a parent arose. Before I left that day, he said to me, "Now, here we have been having a very interesting and important conversation that we need to have more of. But in the time I spent having this conversation, I have failed at least three times as a principal."

As much as I learned about technology and schools in that visit, the most important lesson of the day came in that one statement he made. Anyone who has spent any time at all in a school knows that it is a site of constant activity and unpredictability, where all the energy of faculty and administrators is absorbed by the demands of the immediate circumstances. What that means for educational technology is that the focus of new technology initiatives tends to be on the "mechanics" of implementation—that is, on the nuts and bolts of installation and basic training, on how to make the machines work. Meanwhile, the questions of *why to* make the machines work, and whether it is even appropriate to buy into the aggressive implementation of educational technology, are rarely discussed. The fact that they are not often discussed, however, does not mean that they have no impact on what happens when new technology is introduced into the classroom. Teachers' concerns about technology often center on issues beyond implementation and training, on issues that lie at the heart of their sense of professionalism and their beliefs about the relationship between teachers and students. Where technicians focus on giving teachers technical skills, many teachers are thinking about how the technology might change the character of the classroom experience and the nature of their profession—in particular, how it might be used to deskill and deprofessionalize teaching. This is not to say that teachers are, on a whole, or ought to be, opposed to technology; more that they recognize that adding a new technology to the resources available to them is something of a mixed blessing whose implications are quite complicated.

The day-to-day challenges of supervising technological change in public schools are enough to occupy every waking moment of school administrators. Equipment malfunctions, budgeting decisions, hardware and software selection, and staff development all demand regular attention and care, and threaten to overwhelm school leaders. However, educational leaders also need to develop the habit of thinking about some of the other issues that are of great concern to teachers—for example, issues concerning privacy and professional autonomy, freedom of expression for teachers and students, the inequities of access to technology among student populations, and the commercialism that fuels so much of the push to put new technology in schools. Each of these topics will be discussed separately in the pages that follow.

Privacy

At the same time as new technologies have excited many teachers and offered interesting new ways to engage students in the learning process, they have also threatened the privacy of teachers and students. Computers provide a number of ways of monitoring classroom activity; who is permitted access to these records, and how that information is used, threaten to compromise the privacy of those whose activities have been recorded. For example, it is possible to determine which web sites have been visited on a particular computer, or with a particular account. Taken out of context, many such visits might appear inappropriate or unjustifiable, when there might actually be a perfectly good reason or explanation for the visit. For example, a student might mistakenly find himself at a web site considered to be inappropriate for him because there is a link to it from an acceptable site, but the record of sites visited would have no way of showing that the visit was accidental. A teacher might choose to visit a controversial site—for example, one containing hate speech—not to support or promote the views expressed there, but to learn about them in order to counter them. Again, all a record of sites visited would show is that someone was there, not why he or she was there, and it is possible that students and teachers will be unfairly penalized for misusing their Internet privileges. At the very least, users should be given the opportunity to explain their intent. Still, the mere knowledge that others will know where they have been is likely to have a chilling effect on their Internet wanderings. Howard Rheingold describes this as a "panoptic" effect—that is, when people are aware that they might be under surveillance at all times, they alter their behavior because they believe they are being watched (even if they are not) (Rheingold, 1993).

It is important to distinguish here between holding users accountable for their actions and violating their privacy. It is entirely reasonable to expect all account holders to abide by the rules of the acceptable use policy in force. When violations occur, there ought to be consequences (provided, of course, that the acceptable use policy is fair). However, as long as users are behaving responsibly, they need to be given some latitude in their activities. Of course the standards need to be different for teachers and students. But in an age where it sometimes feels as though anything goes in the name of "accountability," it is especially important to think about how everyone's privacy is going to be protected as more and more information about classroom activity is made available to wider audiences. In a recent court case, a parent sued for the right to view the local school district's web logs, in order to see if the district's acceptable use policy was working (http://www.eschoolnews.com /showstory.cfm?ArticleID=1724). Whether such logs are private or a matter of public record has yet to be determined. However, it is not hard to imagine how such records could be misconstrued if distributed publicly, stripped from the curricular context in which they were first generated.

Another Internet-related threat to privacy concerns "cookies," which are files placed on a user's hard drive, upon visiting a web site, that are usually meant to make the user's subsequent visits to that web site more useful, or more personalized. For example, some web sites ask for the user's name, and a cookie file is used to enable the site to welcome that user back by name when he or she visits again. Some sites monitor the purchases made there, and provide customized lists of recommended purchases based on that information.

There are many uses of cookies that are perfectly benign, and that pose no threat to the user's privacy. However, "third party" cookies are those that are used to create targeted advertising based on the person's web usage—for example, by keeping track of the sites visited by the user, or by asking the user for personal information and then using it, or selling it, for marketing purposes. Although browsers can be set to notify users that a web site uses cookies, most people turn that feature off, because cookies are so common and the constant popping up of the warning window becomes tedious. As a result, most people are unaware of the ways in which their privacy is compromised by third party cookies.

One problem with cookies that bears directly on schools is the question of whether cookie files are a matter of public record. In a recent court case, the publisher of an online newspaper in Cookesville, Tennessee asked for access to the cookie files on the computers of government employees, including public school teachers. The idea here was that taxpayers had a right to know if these employees were behaving responsibly on the job. However, here is another case, like the case involving web logs, where the files could easily be misinterpreted, particularly with respect to teachers. Internet research on school time, including visits to controversial sites, can be an entirely appropriate part of a teacher's lesson planning or professional development, but there is a good chance that their motives would be misjudged if their activities were made public.

Another school-related problem with cookies (which relates to the problem of commercialism) is that many schools can only afford new technology through partnerships with businesses that provide technology in exchange for the right to expose children to advertising, or to collect marketing data from them. For example, education "portal" web sites provide a kind of user-friendly gateway to the internet, often with advertising on the sites, and often with the collection of marketing data through the use of cookies. One such site, called Highwired.com, claims the right in its privacy policy to "share the personal information you provide to us with third parties who are affiliated with our sites, or who provide services to our sites" (http://www.lightspan.com). Their policy also states that if users supply their addresses and phone numbers, they may be contacted with promotional materials. The policy also asserts Highwired's right "to assign, sell, license or transfer any information, including personally identifying information, that our visitors have provided to us to third parties" (http://www.lightspan.com). One might argue that by stating these policies clearly on the web site, users have been amply warned. However, in this case, the policy is (like many such policies) hidden in a fine-print link that users have to know to look for, or they are unlikely to notice it at all. In an age of school-business "partnerships," one must always question whose interests are really being served, and whether public schools should have to sell their students to advertisers to finance the acquisition of curricular resources. At the very least, school leaders need to make a habit of reading this fine print before embarking on such partnership ventures.

Educational leaders should also be aware of the provisions of the Children's Online Privacy Protection Act of 1998. This law requires parental consent before a web site can gather personal information from children under the age of 13. Many sites had been asking children to complete surveys before entering a contest, or playing a game. Now, children under 13 need parental consent before they can provide such information. Three members of Congress have pushed this issue further, advocating legislation that would require schools to obtain parental consent before accepting free equipment or services from telecommunications companies, or risk losing federal funding (http://www.eschoolnews.com/showstory.cfm?ArticleID=1508). Opponents of this legislation argue that it would hinder valuable partnerships that provide resources to schools; advocates stress that no program that exchanges such resources for marketing data is appropriate in public schools.

Another privacy-threatening idea that has not spread widely, but that is worth keeping an eye on, is a proposal made by former New Hampshire Republican gubernatorial candidate Jeff Howard, who advocated the installation of web cameras in public school classrooms so parents would be able to see what was going on in their children's classes. Web cameras are already in use in some daycare centers and private schools, but have not yet been used in public schools. The American Federation of Teachers opposes the idea, suggesting that if parents want to know what is going on in their children's schools, there are less expensive and more appropriate ways to find out. Another potential problem is that people other than parents might somehow gain access to these web sites (which would be password-protected), which might pose a danger to the children involved (http://www.eschoolnews.com /showstory.cfm?ArticleID=1335).

Child safety is also related to Internet privacy concerns when it comes to the controversy over putting students' likenesses or full names on school web sites. Many schools refuse to do either, fearing that it would put those children at risk. However, many student journalists have opposed these policies, claiming that their rights to free expression have been compromised. The balance between protecting privacy and permitting expression is a complicated one. Although students have long been identified in school publications, those publications have never had worldwide distribution. To what extent do students have First Amendment rights on the Internet?

Freedom of Expression

Students do not have unlimited freedom of expression in school, or through official school publications; this has long been a source of frustration among student journalists, who can be censored when writing for official school newspapers. What many students have discovered, however, is that they can "go underground," creating online student newspapers that can legally circumvent the censorship of official school papers. The Student Press Law Center in Arlington, VA estimates that there are 10,000 underground high school newspapers on the Internet, much to the chagrin of many school administrators. As highlighted in the first episodes of the new television series "Boston Public," student-made web sites are often irreverent, and critical of school personnel. Besides the personal offense they sometimes pose to those named or criticized on the sites, they sometimes contain expressions of anger or alienation akin to that found on the Columbine gunmen's sites, leaving school officials wondering where the balance is between freedom of expression and personal and public safety (http://www.eschoolnews.com /showstory.cfm?ArticleID-1742). Another concern is that when students are censored in official school publications, they learn important lessons about responsible journalism and about libel. By going underground, they find an outlet for their views, but they do not always appreciate the consequences of their expression.

As a rule, courts have upheld the right of students to express their criticisms on their personal web sites. For example, a Missouri boy was suspended for ten days in 1998 because he criticized school officials on his web page, and provided a link to the school's official site, urging visitors to e-mail the principal. Although he complied with the school's request that he dismantle the site, he was still suspended, and the ACLU sued the district on his behalf; in February 1999, the courts upheld his right to have the web site. Similarly, a Florida student was also suspended for ten days in 1998 for criticizing his school and school administrators on his web site, but was able to get his punishment reduced with the help of the ACLU. In another 1998 case, an Ohio student was awarded $30,000 from his district when he challenged their suspending him for insulting his band teacher on his web site. In general, then, when students are punished for criticizing their schools on personal web pages, the courts uphold students' rights to do so.

One form of expression that has not been protected has been that which is believed to constitute a danger to the person being criticized. For example, a fourteen year old Pennsylvania boy made a web page about his math teacher, outlining "Why She Should Die" and soliciting donations to pay for a hit man. Although this was most likely a poor attempt at satire, the courts found it to be a threat to the woman's safety, and upheld the school's decision to expel the student. There is a distinction to be made, then, between critical speech and threatening speech; the former is generally protected, where the latter is not.

The issue of freedom of expression involves not only students' online expression, but the online information to which they are permitted access. It is becoming increasingly common for schools to install filtering software on their Internet-accessible computers, which blocks users' access to certain web sites. These filters come in several varieties, the most popular of which block access to a list of web sites that is continuously updated as online content changes.

At issue here are the criteria used to block sites. Some filters demonstrate political biases in what they filter—for example, by making pro-life sites available to students, while blocking pro-choice sites. Another issue would be whether teachers can override the block if they deem it appropriate to do so, or whether they are denied the autonomy to make choices for their own students. New York City teachers were recently frustrated by the installation of filtering software that they were not trained to override, and that blocked, among other things, the last chapter of *The Grapes of Wrath* (where a woman allows a starving man to drink milk from her breast) and web sites on diabetes (because erectile dysfunction is one of the disease's side effects). At the same time, they have expressed their dismay that many commercial sites, such as the Victoria's Secret online catalog, are not blocked.

There is also the question of whether filtering should be mandated in public schools. Several years ago, Senator John McCain promoted the School Internet Filtering Act, which would have required schools receiving federal "E-Rate" funds to install filters. There is a certain irony to Congressional interest in Internet filtering, given that they chose to release the Starr Report online. That is, they express a certain disdain for the kind of material that is available online, yet they also contribute to it. As a matter of fact, a Congressional committee on the E-Rate program had to leave a meeting several years ago on "Legislative Proposals to Protect Children from Inappropriate Materials on the Internet" to go vote on whether or not to release the Starr Report.

The E-Rate program, incidentally, is a federal effort to address another serious educational technology issue—that of the "digital divide." The disparities in access to technology among American children continue to be very disturbing, and need to be in the consciousness of school leaders.

Access

The expression "digital divide" has quickly gained currency in the past few years, referring to differences in access to new technology among different classes, ethnicities, genders, and geographical regions—in schools and communities, and at home. It refers not only to the presence or absence of computers, but to the ratio of computers to users, the type of software available, the existence of Internet connections, the quality and speed of those connections, and the content of online resources.

A 1998 report by the National Telecommunications and Information Administration of the U.S. Department of Commerce named the digital divide as "one of America's leading economic and civil rights issues" (www.ntia.doc.gov/ntiahome/fttn99/introduction.html); although access is increasing for all groups, it is increasing faster for some groups than others, thereby *increasing* the actual divide. This study found, for example, that white families were more likely to have Internet access at home than African American or Hispanic families at any location. Americans in rural areas had less Internet access than Americans in suburban or urban areas.

Political responses to digital divide problems have tended to focus on technical aspects of access. For example, the E-Rate program uses income from a tax collected from telecommunications companies to provide schools and libraries with telecommunications services. It emerged out of President Clinton's commitment to connect all American public schools to the Internet by the year 2000, and has provided millions of dollars of funding in the few years it has been in existence. However, the access issue goes beyond providing the technical connections; it also has to do with what people find when they get online, and whether it is relevant to their needs and concerns. A study conducted by the Children's Partnership found that Internet content tends to be short on exactly what underserved populations say they need the most. For example, when 21 million Americans over the age of 18 have incomes below the poverty line, there is precious little information online about local community services, employment, education, and job training. An estimated 87% of online documents are in English, yet some 32 million Americans speak a language other than English as their primary language. There are very few web sites that are accessible to adults with limited literacy skills. All told, this study estimated that 50 million Americans face at least one of the main barriers to finding the Internet useful—not because they weren't wired, but because there was very little for them online (www.childrenspartnership.org).

School leaders need to be aware of the many dimensions of the digital divide and its implications for school-based computer use. For example, schools in communities where access is limited might think about serving as community access centers for adults in those communities. Educators in communities where there is a wide range in children's home access have to be sensitive to those disparities when creating and grading homework assignments. School web sites and e-mail are celebrated as wonderful ways to communicate with parents, but only if parents have Internet access. Although access is increasing for all Americans, it is reasonable to expect the divide to continue to exist, and school leaders should be mindful of its consequences for students and teachers.

Commercialism

School leaders also need to be very thoughtful about the degree to which they allow commercialism into their schools through new technology. There are several key ways in which new technology stands to increase corporate involvement in schools. For one, the corporate world has an interest in shaping the curriculum so as to include in it the kind of training that they would otherwise have to provide new workers; right now, that certainly includes training in the use of computers. Although one responsibility of public education is certainly to prepare students for life as adults, including earning a living, it is important not to make the primary purpose of public education the efficient training of a workforce. Such a purpose comes only at the expense of a rich and varied educational experience that permits all students to explore their unique abilities and interests.

Second, a "global information economy" requires a high volume of sales of information products and services, and schools are a huge market for them; consequently, a good bit of corporate involvement in educational technology reflects profit motives, rather than the best interests of students. Schools are not only potentially lucrative markets for information industries; they are also good places for those products to be placed, because their presence in schools confers a degree of legitimacy on them that might increase home sales by parents, as well.

Finally, web sites have become the latest way for commercial interests to spread their message to students, adding "educational" sections to their sites and providing curricular materials online. Classroom materials that have been produced for decades by companies marketing products to children are now distributed via web sites. For example, the web site for M&M's candy provides pie charts showing the proportions of each M&M's color in a typical package, and lessons on how to teach probability through student use of M&M's packages.

A more elaborate chocolate undertaking comes from Hershey Foods, the teacher section of whose web site offers an entire, interdisciplinary, middle school curriculum centering around Hershey chocolate. Among the goals of one unit in the Hershey program are for students to "describe chocolate's place in a well-balanced diet" and "make a favorite chocolate snack or dessert"; teachers are reminded that "Flavored milk, such as chocolate, is well liked by children and helps to increase milk and nutrient intake" (http://www.hersheys.com/consumer/teacher/dream_machine/page_2.html#2). In 1934, Arthur E. Morgan, chair of the Tennessee Valley Authority, expressed his concern about the dangers of commercial involvement schools—dangers which, at that point, he felt had been averted:

> Suppose our public schools had been established on a purely commercial basis....There might be no charge to the public for our public schools; the teaching staff might be supplied by the toothpaste manufacturers or patent medicine manufacturers...and they would have textbooks describing the values of toothpaste or patent medicine. (Morgan, 1934, p. 81)

Although his scenario was meant to be regarded as ludicrous, it is not far from many contemporary commercial schemes to tap into a lucrative market, and a captive audience, of schoolchildren. School leaders need to be thoughtful about the degree to which they allow commercially-produced (and biased) curricular materials into the school environment.

Conclusion

In short, then, school leadership in a technological age requires thoughtfulness on many complicated issues. Unfortunately, the more practical level of technology implementation tends to monopolize the time of administrators, leaving these other issues inadequately addressed. Meanwhile, it is these issues that will often make or break technology initiatives in schools, because they are the ones that speak to teachers' concerns about themselves and their students, and that help them decide whether to buy into reform, or whether to resist it. In that sense, then, these issues are at least as important as the more "basic" matters of acquiring the machinery and teaching everyone how it works—matters which must be dealt with skillfully, but which will not, alone, ensure successful implementation of new technology.

References

Morgan, A. (1934). Radio as a cultural agency in sparsely settled regions and remote areas. In T. F. Tyler (Ed.), Radio as a cultural agency: Proceedings of a National Conference on the use of radio as a cultural agency in a democracy (pp. 77-83). Washington, DC: The National Committee on Education by Radio.

Rheingold, H. (1993). The virtual community: Homesteading on the electronic frontier. New York: Harper Perennial.

Leading Academic Change – through Connective Leadership and Learning

Manoj Chandra-Handa
Department of Computing in Education
Knox Grammar School
Australia
manoj@knox.nsw.edu.au

Abstract: Leading academic change in our educational organisations requires a paradigm shift at two levels – both in *learning* as well as *educational leadership*. One of the central premises behind these much-needed paradigm shifts is my inherent belief that a major aim of education should be to prepare our students to participate in and contribute to contemporary society. To do so, the learning paradigm needs to shift from teacher-centred, "broadcast" instruction to interactive, connective learning in educational organisations. It is an environment that focuses on *learner-centred education*; embedding technology into the curriculum; and the *educational* institution becoming a *learning* organisation where teachers share learning with students. To reach that colourful, compelling dream of learner-centred education, we need visionary, connective leadership in educational institutions - a leadership that connects by two-way arrows, with a paradigm shift from independence to *interdependence*, from control to *connection*, from competition to *collaboration*, and from individual to *group*.

Introduction

Leading academic change in our educational organisations requires a paradigm shift at two levels – both in *learning* as well as *educational leadership*. One of the central premises behind these much-needed paradigm shifts is my inherent belief that a major aim of education should be to prepare our students to participate in and contribute to contemporary society. To do so, we need to go beyond the established traditional teaching and learning practices. In a contemporary classroom, it is the "connective learning" by knowledge workers that is going to prepare our young students for the challenges of the new millennium.

The *learning paradigm* needs to shift from teacher-centred, "broadcast" instruction to interactive, connective learning in our educational organisations, as illustrated in (Figure 1). It is an environment which focuses on *learner-centred education*; integration of technology in a seamless manner to support and extend our curriculum objectives; the *educational* institution becoming a *learning* organisation where teachers *share* learning with students; and students are exposed to a curriculum infused with exciting and technology rich learning programs. In a learner-centred model, the New Teacher, who employs meaningful use of learning technologies, becomes a role model in the class and offers creative problem solving experience. The teacher takes the role of *scaffolder of learning*, fostering learning how to learn.

To reach that colourful, compelling dream of learner-centred education, we need visionary, connective leadership in our educational institutions – a leadership that *connects by two-way arrows*. We need a shift in the *educational leadership paradigm* from "independence to *interdependence*, from control to *connection*, from competition to *collaboration*, from individual to *group*, and from tightly linked local alliances to loosely connected global *networks*" (Lipman-Blumen, 2000, p. 226). The new leadership model in educational institutions focuses less on the individual personality of the leader and more on the group – in all its diversity and interdependence. A connective leader does not indulge in, what the philosopher Jean Baudillard describes, the "dance of the fossils" – a preoccupation with controlling those 'lower down' in the hierarchy and focussing on the maintenance of present systems (Clarke, 2000, p. 131). A connective leader sees his environment as a network of peers rather than hierarchies of ranks. He helps to keep people around connected and energised in the new learning landscape – shifting their mindset from schooling to learning, from the traditional structures of sequential, linear understandings of schooling to constructivist, non-linear, hypermedia learning.

Following steps are needed for the *process of leading academic change* to be effective and meaningful:

2. Deciding On The Strategic Thrust Of An Organisation: Team Learning

In realising the vision, when it comes to embedding technology into curriculum, you can introduce it, you can give it a sharp focus, you can design it, you can write units of work, you can write endless outcomes of it. But at the end of the day, if it is going to work, it is teachers in the classroom – the barefoot doctors – who will make it work! I think, therefore, it is critical that the strategic thrust of an organisation should be on *team learning* as a connective leader understands that teams can learn: in sports, in the performing arts, in science, there are striking examples of the team that exceeds the intelligence of the individuals of the team, and where teams develop extraordinary capacities for coordinated actions in order to achieve the organisational vision.

In order to create a learning team environment, the connective leader encourages his members to imbibe the practices of dialogue and discussion – the two distinct ways that teams converse. Senge (1999) clarifies that in a dialogue, different views are presented as a means of discovering a new view. In a discussion, decisions are made. Dialogues do not seek agreement, rather a richer grasp of complex issues through a deep "listening" to one another. Effective learning teams need to be able to distinguish between dialogue and discussion and move consciously between the two. A connective leader acts as a facilitator of dialogue and discussion. As teams develop experience and skill in dialogue, the role of the connective leader as facilitator becomes less crucial and he can gradually become just one of the participants. Dialogue emerges from the "leaderless" group once the team members have developed their skill and understanding.

In an aligned learning team, a synergy develops and the shared vision becomes an extension of the team members' personal visions. Using Senge's (1999) metaphor in musical terms, the connective leader works towards developing the learning team as an ensemble. He strives to make the team members reach a state when the ensemble "plays as one." The music "flows *through* you rather than from you" (p. 235). In truly aligned team meetings, it is not remembered "who said what" but there is a shared understanding of just getting to a point of knowing what they need to do. In this sense, the word *team* takes a different meaning: it is a group of people "who need *one another* to act" (p. 236). Ultimately, the teams learn how to tap the potential of their colleagues as they realise that the IQ of the team can, potentially be, much greater than the IQ of the individuals.

A connective leader recognises that in order to achieve the vision, the strategic thrust of an organisation must remain on team learning. He understands that it is teams, not individuals, that are the fundamental learning unit in modern learning organisations. Unless teams can learn, the organisations *cannot* learn.

3. Strategic Issues

a) Staff Empowerment Issues

One of the primary strategic issues for an organisation should be to *plan a successful staff development program* that prepares them for the challenges of the connective learning environment. Teachers need to receive sufficient training and resources to help them effectively plan and execute projects that integrate technology across the subject areas. This teaching model requires them to rethink and reshape their curricula. For many, learning to integrate technology and curricula means mastering a series of challenges, including learning how to use a variety of technology applications; designing technology-enhanced curricula to meet students' needs; using and adapting online curricula; expanding their knowledge of their subject areas and taking on the new roles of *scaffolders of learning* and coach. Practical, real-life experiences will be shared with the audience on a variety of issues such as building a staff team of "computing in education trainers" with ongoing staff training, encouraging and rewarding top performance, and providing adequate resources to the staff.

b) Network Issues

It is essential that the educational organisation's *network is conducive to creating a learning environment* for students, teachers and parents to share and communicate with one another in a way that facilitates connective learning. Choosing a network operating system is very critical. The key things to consider are flexibility, security, ease of integration and use as well the cost involved. It is vital that the educational goals are realised by choosing *appropriate* technology. To do so, it is important to consider how technology that is going to be used to accomplish those educational goals will provide and support a challenging curriculum;

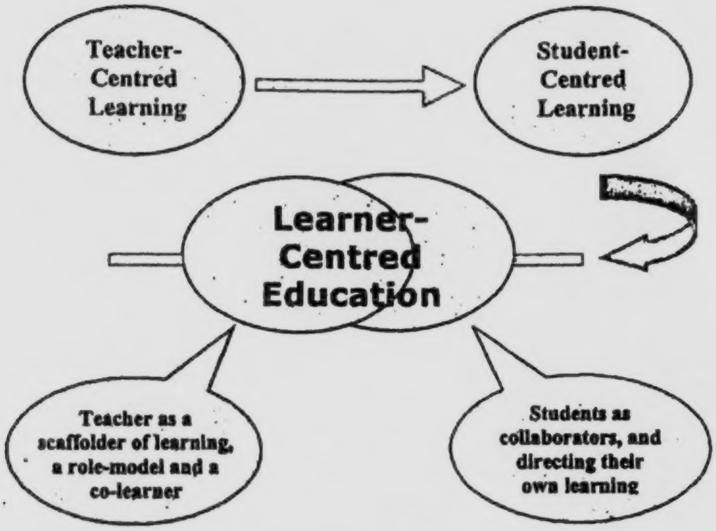

Teacher-Centred Learning
Student-Centred Learning
Learner-Centred Education
Teacher as a scaffolder of learning, a role-model and a co-learner
Students as collaborators, and directing their own learning

Figure 1: The shift in the learning paradigm from teacher-centred to learner-centred education.

1. Shaping a Shared, Strategic Vision of the Future

Clemmer (1999) reminds us, "Take time to dream!" In each creative mind a dream takes wings and keeps urging, "It could be, It will be…". In the mind of a visionary leader, it won't go until the dreamer heeds and shapes it into reality! (Clemmer, 1999, p. 28).

Simply stated, a vision is a realistic, credible, attractive and inspiring future for the organisation. Like a travel poster, a vision does not show how to get somewhere, but it does present a clear and exciting image of what the world might be like when you arrive.

Connective leaders have clarity of vision, which they share with their colleagues. They know that nothing else will unite and enthuse people in an organisation so much as a *shared vision* for the new connective learning landscape. A vision is not just an idea. It is rather a force in people's hearts, a force of impressive power. It gives people a sense of common ownership that enables them to cooperate with and support each other in pursuit of their common destiny. When people truly share a vision, they are connected, bound together by a common, lofty goal. A shared vision changes people's relationship with the learning organisation. It is no longer, "their organisation," it becomes "our organisation."

Nanus and Dobbs (1999) tell us that a shared vision empowers people encouraging them to take initiative to advance the common effort. A shared vision is a major source of hope and self-esteem for people in the organisation. Once people understand the big picture, they can see the value of their own contributions. They feel pride in being part of an organisation with an important social purpose. For many people a shared vision gives meaning to their lives and makes them want to go the extra mile to help the organisation achieve the vision.

A connective leader recognises that *shared visions emerge from personal visions*. This is how the connective leaders derive their energy and foster commitment. Peter Senge (1999) elucidates that learning organisations, that wish to build shared visions, continually encourage its members to develop personal visions. People with a strong sense of personal direction can join together to create a powerful synergy toward what I/we truly want. This is the art of visionary leadership – how shared visions are built from personal visions, "the art of seeing the forest *and* the trees" (Senge, 1999, p. 127). Visions that are genuinely shared require ongoing conversations where individuals not only express their personal dreams, but also learn to listen to each other's dreams. A connective leader facilitates this listening in the learning organisation, and ultimately as the shared vision develops, it becomes both "my vision" *and* "our vision".

BEST COPY AVAILABLE

support learning programs for all students; support and provide meaningful professional development experiences for staff; and enhance "home-educational institution-community" collaboration and communication. Our organisation's case study will be shared with the audience.

c) Curriculum Issues

Embedding learning technologies into Outcomes based, learner-centred curriculum is at the *heart of connective learning paradigm*. A connective leader recognises that the textual environment has changed in the 20th century and will continue to evolve in the new millennium in which students will spend their adult lives. One of the major changes is that print is, in a sense, being realigned alongside other kinds of texts – mostly *visual*. We as professionals in our organisation need to adapt to the changing textual landscape – *bringing both print and visual texts together in our classrooms*. To broaden learning for our young people, we need to make them engage consciously with a range of media texts. This does not mean less reading for our students, as some of us may assume, in a conventional sense. On the contrary, as Andrew Goodwyn (1998) points out, "it means both more reading and more intelligent reading *in relation to each other*" (p. 131).

As scaffolders of learning, we need to recognise that the students will need support and stimulation as they struggle to make meaning of the wide range of texts. The learning programs, therefore, need to offer, what I call, *'multimedia scaffolding'* in order for our students to be able to personally engage with the texts and recognise a range of meanings into these texts – print or visual. An innovative, learner-centred unit of work on Shakespeare's *A Midsummer Night's Dream* will be shown to the audience. The unit draws upon an integrated hyper-linked world of a wide range of media texts – such as music, video clips, illustrations, written text, audio recording, web based animations – and invites the reader to make meaning of the texts *in relation to each other*.

Connective leaders do not oppress themselves with the "Tyranny of the OR" – "the rational view that cannot easily accept a paradox, that cannot live with two seemingly contradictory ideas at the same time" (Collins & Porras, 1999, p. 43). The "Tyranny of the OR" pushes people to believe that things must be done either A OR B, but not *both*. Instead of being oppressed by the "Tyranny of the OR", connective leaders liberate themselves with the "Genius of the AND" – the ability to embrace both extremes of a number of dimensions at the same time. Instead of choosing between A OR B, they work out to have both A AND B.

That is why, connective leaders, who liberate themselves with the "Genius of AND", strive to provide a connective learning landscape that embraces a whole gamut of learning activities such as online lessons by staff using the Intranet (and Internet), online discussions by staff and students, online class work and homework by students using Intranet at the learning organisation as well as from home, online marking of students' work, creating study notes by students using hypertext, online examination in classrooms, online recording of marks by teachers using the outcomes based multimedia electronic mark book, online reporting and writing of comments using a reporting program, access to student reports by the parents online from home. Specific examples of the work will be shown to the viewers in relation to the above-mentioned learning environment.

d) Student Issues

Don Tapscott (1998) suggests that the new generation (who are growing up with technology) *assimilate* technology as opposed to the adults who must *accommodate* it (who have an established thinking pattern). The children of the new generation are *active learners* engaging directly with the technology by using powerful tools to probe, analyse, organise and synthesise material. In this sense, they are becoming stronger, independent thinkers. It is the 'receiving' by students – not the 'delivering' – that is crucial. Good teaching ensures students 'receive' – that they are tuned into, and make a personal sense of, the information that abounds.

Various aspects of student issues such as student technology leadership; creating study notes using hypertexts (that reinforces the proactive role of the reader who actively constructs the text through the making of navigational choices); online discussions; creating own websites; and using visual texts will be addressed.

e) Wider Community Issues

The wider community must remain part of this picture. Educational organisations can no longer exist in isolation from the larger community they serve. For education to reflect the skills, attributes, and collaborative learning models needed in the adult world, schools must become an integral part of that world. Linking the greater community to share responsibility for the future of children is the key to achieving a truly *connected learning community*. It is essential we keep the parents informed about our vision and the strategies to achieve the connective learning environment. This can be achieved through a variety of ways such as conducting parent evenings, having open days, visits by key educationists, video production, brochures, newsletters and through the website of the organisation. Please refer to (Figure 2) for an overview of the Connective Learning landscape.

4. Generating Short-Term Wins

Connective leaders thank, appreciate, recognise and celebrate accomplishments. They realise that short-term performance improvements help transformations in a variety of ways. Kotter (1996) reminds us that short-term performance improvements help transformations in a variety of ways. They give the effort needed reinforcement. They show people that the sacrifices are paying off, that they are getting stronger. For those driving the change, these little wins offer an opportunity to relax for a few minutes and celebrate. A little celebration following a win can be good for the morale of the staff. The process of producing short-term wins can help the management test its vision against real conditions. Quick performance improvements undermine the efforts of cynics and major resisters. Visible results help retain the essential support of management. Short-term wins help build necessary momentum. Fence sitters are transformed into supporters and reluctant supporters into active participants. This momentum is critical, the energy needed to complete the process of change vision.

5. Consolidating Achievements and Evaluating Long-term Trends

A connective leader ensures that his team continues to consolidate achievements of the organisation whilst moving on to new pathways. The visionary leader also keeps in mind the long-term trends as he takes strategic decisions into employing meaningful use of learning technologies in the short term.

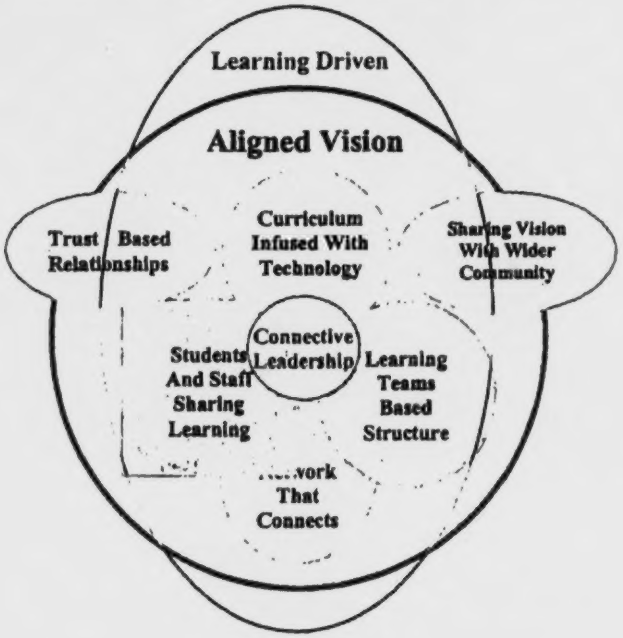

Learning Driven
Aligned Vision
Trust Based Relationships
Curriculum Infused With Technology
Sharing Vision With Wider Community
Connective Leadership
Students And Staff Sharing Learning
Learning Teams Based Structure
...work That Connects

Figure 2: An overview of 'Connective Learning Landscape'.

BEST COPY AVAILABLE

Concluding Remarks

For an effective, connective learning environment in our educational institutions, we need to make a paradigm shift at two levels – both in *learning* and *educational leadership*. At the heart of the learning organisation is a *shift of mind* – from seeing parts to seeing wholes, from reacting to the present to creating the future, from seeing ourselves as separate from the world to be connected to the world, and from employing reactive, teacher-centred instruction to collaborative, learner-centred education.

The *new learning paradigm* is more creative and satisfying for the teacher. It also empowers the students. It involves embedding learning technologies into the curriculum – a new model of learning – one based on *discovery* and *participation*. The new paradigm of connective learning, I believe, has enhanced outcomes for the knowledge workers who ultimately spend more time in collaborative work and creative problem solving; construct meaning in their own minds through interactive learning technologies and become stronger thinkers; become independent and interdependent learners with flexible outlooks; become pro-active risk takers; integrate the 4Rs (Reading, wRiting, aRithmatic and Reactive) with the 4Xs of the connective learning landscape (eXploration, eXpression, eXchange and eXtension); acquire research, resourcing, analytical and presentation skills; and experience a learning renaissance.

To accomplish this powerful dream of learner-centred education, we need a *new leadership paradigm* that connects by two-way arrows. In a contemporary learning organisation, as I perceive, the connective leader becomes a craftsman of shared vision, a scaffolder of learning and a teacher. Although initially it is the connective leader who must initiate and bear the torch of the strategy process for leading academic change, it is the people of the organisation who ultimately make this dream possible. Expecting everyone to share the burdens of leadership, the connective leader sparks in other people self-confidence, creativity, ownership and loyalty. He liberates the leader in everyone. As the implementation process of connective learning landscape proceeds, he monitors progress, keeps the board informed, and shares the celebration of various accomplishments with staff members from time to time.

Whether we are leading our lives, leading our work or leading our organisations, we are continually "going beyond what is" (Essex & Kusy, 1999, p. ix). If we are not going beyond what is, we may be *managing* what is but *not leading* others and ourselves into the future. Connective educational leadership "goes beyond what is." An innovative, visionary leader as a strategist in *leading academic change* for a connective learning environment must fast-forward his strategies and leadership into the future, *now*.

References

Clarke, P. (2000). *Learning Schools, Learning Systems*. London: Continuum.

Clemmer, J. (1999). *Growing The Distance*. Canada: TCG Press.

Collins, J. C., & Porras, J. I. (1999). *Built to Last*. London: Random House Business Books.

Essex L., & Kusy M. (1999). *Fast Forward Leadership*. London: Prentice Hall.

Goodwyn, A. (1998). *Literary And Media Texts In Secondary English*. New York: Cassell Education.

Kotter, J.P. (1996). *Leading Change*. Boston, MA: Harvard Business School Press.

Lipman-Blumen, J. (2000). *Connective Leadership*. New York: Oxford University Press.

Nanus, B., & Dobbs, S.M. (1999). *Leaders Who Make A Difference*. San Francisco: Jossey-Bass Publishers.

Senge, P.M. (1999). *The Fifth Discipline*. Sydney: Random House Australia.

Tapscott, D. (1998). *Growing Up Digital*. New York: McGraw-Hill.

Accountability, Technology, Flexibility: Ensuring Student Success

Kathryn Floyd, Ph.D.
Assistant Superintendent (retired)
Pickens County Schools
USA
katefuga@aol.com

John T. Moore, Director
State of South Dakota
Department of Education and Cultural Affairs (DECA)
Division of Education Services and Resources
USA
john.moore@state.sd.us

Terry Bailey, Interim Director
Information Technology
Ball State University
USA
tbailey@gw.bsu.edu

Cheryl Reed, Ph.D.
Coordinator, Proposals and Publications
EdVISION Corporation
USA
creed@edvision.com

Abstract. When school systems find they must adjust what they are delivering because their performance measures show they are "low performing," how can a system efficiently and effectively adjust the curriculum? Can the web help us test students more efficiently? How can teachers and administrators get meaningful, timely guidance so that they know what is expected, whether or not they are providing needed instruction, and which resources target those needs? This paper describes software applications that provide critical assistance to school systems in responding to the changing expectations being experienced in the emphasis on accountability and meeting "standards" or expectations.

Introduction

Accountability mandates require that districts, schools, principals and teachers focus clearly on those measures by which their students are held accountable. High stakes test results and state standards identify much of what school districts must ensure that their students learn, because these identify the bulk of specific accountability expectations. A critical issue is how school districts can respond quickly, accurately, and with continued flexibility to changing expectations. How can K-12 schools ensure that what we ask teachers to teach--and the resources we provide them to teach with--address the expectations of these accountability mandates? Can information technology help school systems to make sure they are teaching, not only the content of the curriculum required by the state, but also what is actually tested? Can educators and software developers work together to ensure student success? How can these issued be addressed in training pre-service teachers? This article offers four perspectives--District, State, University, and corporate--on using technology to meet accountability mandates.

Kathryn Floyd: The District Perspective

Electronic curriculum management for assisting low performing schools

Like Chicken Little, the public cries, "Our schools are failing! Our schools are failing!" What is the response to those cries? "High stakes" tests in public schools. What's at stake? Public trust and support for public schools. Results, in the form of improved outputs reflected in student test scores, are demanded by legislatures across the nation with the state boards of education enacting offices of accountability. The core issue confronting public education in most states is proving to the public that their students are showing improvement in academic performance: How will we define success? How will we know we have succeeded? Expectations for student learning are created, reviewed, revised, and updated continually.

In a not-too-unusual scenario, new teachers are provided the new curriculum (maybe one document per room, department or school), textbooks for the students, a lesson plan book, a grade book, and class rolls. Far too often the teacher sets everything aside but the textbook. S/he begins looking at the table of contents to decide *what* s/he will "cover." If s/he's a high school teacher, s/he will likely begin devising a semester syllabus to identify *when* s/he will "cover" *what*. Experienced teachers often look at a newly adopted textbook and related materials to see where the new book fits with what they are accustomed to teaching. If they find too much new material, they may pull out files from units taught in past years and decide how they can still use what they are comfortable with. After all, they are the curriculum experts, right?

Later, when assessments are given to their students, these teachers may look at the results and be dismayed to find their students' scores are not what they – and others – had hoped they would be. Student grades on classroom work might be relatively high, reflecting that the students had learned what the teacher expected them to. So where is the problem?' Our schools are accredited; why aren't they doing a good job? Given that the schools and teachers have been provided with the "inputs" accreditation requires, why is there not better "output?" The problem does not lie with the many wonderful teachers who are doing what is becoming, increasingly, an overwhelming task. It lies with how curriculum documents are developed.

Consider this analogy. Assume the teacher's skills in delivering instruction to be those of a skilled archer. The teacher/archer is provided with an array of targets and told to fire carefully. S/he scores a bulls-eye with every shot. Imagine the dismay when the scorekeeper notes a very, very low score! Scorekeeper: "Sorry. Your shots were very accurate, but you aimed at the *wrong targets!*" Teacher: "But I didn't know it mattered which one I hit, only that I hit one accurately!" Similarly, far too many classroom teachers are masters of the content, are wonderful at providing instruction, assessment, and classroom management, and truly love what they are doing, and yet find student tests scores sadly low. Such teachers may have done a masterful job of teaching and the students of learning what was taught. The problem is that what was taught so masterfully, and learned so well, was not what was measured on the mandated tests all students had to take!

As things stand, we cannot expect each teacher to review the curriculum to be taught and the objectives to be tested and then decide what part of the required textbook should be covered and what must be provided from other resources. This is an incredible responsibility--one that school systems can no longer afford to assume individual teachers can fulfill without adequate and very specific guidance. Schools are realizing they must somehow make sure the material in the curriculum and the objectives on the required tests are what teachers are "covering." But first, we must find an efficient and effective way to identify and share that critical information in a written curriculum. We must find a way to revise and update this curriculum, quickly and effectively. Assigning this labor-intensive task to teachers is simply requiring one more mission of those who are already overwhelmed by other responsibilities.

It would be easy to bemoan reducing the curriculum to the kinds of information that can be easily tested and scored. It would be easy to blame the use of norm-referenced tests as outcome measures, an admittedly questionable but publicly-demanded practice to show how local or state students compare to those in other schools across the nation. While all of those concerns may have legitimacy, we must, in the words of Mike Schmoker, "move beyond a counterproductive criticism of existing tests and move toward a more cooperative and transitional path."

The demand is huge for schools to take the expectations identified by the state and measured in mandated tests and align them in an easily-modifiable and teacher-friendly document. Only then can individual teachers focus their energies on instruction of students, on deciding *how* they can help students learn the skills and material and which resources they will use to do that effectively. The *what*--the expected outcomes--has really already been largely decided.; in most cases it just isn't a flexible, working document that is really designed to be used.

We must find a way to help all educators use expectations and performance outcomes to drive our improvement efforts. Educators must identify and use those tools that will help them immediately respond to changing expectations. We must optimize our use of every means of helping educators at all levels: identify patterns of weakness, modify the curriculum, and provide the needed instructional and professional development resources so teachers and others can focus on the "how" of teaching and learning--on instruction and on responding to the individual needs of the students. We need to find and utilize tools that maximize the use of information technology to help educators focus on instructional strategies to optimize student's learning what they are being help responsible for. Teachers need to know where those expectations originate and then be aware of the rewards or consequences if they don't help students master them. When armed with this information, teachers can adjust their pacing and time allocation. Teachers need help in making quick adjustments and in tailoring tests to determine mastery. In light of all that working with students today demands, we must utilize every means possible to maximize time and opportunity for learning.

Students need to be provided clear, up-front expectations and individualized study sheets to help them learn those areas where frequent classroom and end-of-year assessments show they need additional study. What schools are expecting their students to learn must have wide and intensive stakeholder support based on clear and frequent parent communication. The expectations need to be a clear, readily accessible and adaptable public document, not a "stealth" document. Parents need access to those expectations and to resources that help them help their students attain mastery.

Educators need to have access to information technology tools that reduce the labor-intensive nature of responding to all these needs. Pre-service teachers and leadership personnel need to be trained during their preparation programs about curriculum alignment is, why it is necessary, and how it may most efficiently and effectively be done. Teachers and leadership personnel need pre-service training and in-service professional development in how to analyze performance/test scores and related comparative data to use them to modify the expectations, identify gaps and/or overlaps in what is being taught, identify the resources available and/or needed, and allocate resource in the budgetary process to provide what teachers need to help students succeed. In short, *what's* expected in the classroom, the reasons *why* those are the expectations, and the *consequences* of failure to achieve them need to be clear to all. The results of the measures to determine success, however flawed any one assessment process may be in isolation, need to be studied and communicated clearly so educators, students, parents, and the community can know "Did we succeed?" Given that information, the task then is to make modifications to ensure greater success.

Before I retired as Assistant Superintendent of Pickens County Schools, we adopted Curriculum Designer and its related components, Skills Connection and Home2School, products of EdVision Corporation. Curriculum Designer is a curriculum planning system that enables school and district level curriculum teams to align curriculum with state and national standards and to produce a curriculum continuum for K-12, without gaps or duplications. This software efficiently and effectively identified the expectations from the various curriculum and standards requirements and assessments/tests our district was accountable for. Once drafted, our curriculum document could be modified almost instantly whenever the need arose. Skills Connection, a classroom assessment tool, draws on the same database—some 72,000 objectives—to integrate necessary objectives into classroom assessments without requiring teachers to craft each assessment individually. Skills Connection also provides a Home Study Guide for each skill to assist parents in helping their children study at home. *Home2School.com* (a free website for parents) provides constantly updated resources and tools to help parents effectively participate in their child's education. This site includes curriculum resources, tutorial lessons, reading lists, and other information of interest to parents. These software packages are incredible electronic information tools being used by school systems throughout the nation to develop action plans that can truly begin with the *end* in mind.

In this time when the cries of "The public schools are failing!" resound across our nation, we must do all we can to assist our educators in pre-service preparation, graduate coursework, and in-service professional development to become knowledgeable and skilled in using such tools. Information technology tools such as Curriculum Designer and Skills Connection can help educators immeasurably in working with others in their individual school settings and communities to help with the essential task of restoring schools--and the professional educators at all levels that work to help them succeed--to a source of national and local commitment and pride.

John Moore: The State Perspective

Using the web to meet accountability mandates

The state of South Dakota developed state standards at great expense over a considerable period of time. These standards were adopted by the legislature and mandated for school districts to adopt and implement. Teachers have to teach the standards. What we didn't have until recently was a way to measure accountability. No one--at the local, district, or state level--had any way to measure whether those standards were being taught. An external audit showed that there wasn't a true one to one correlation between the national test (SAT9) and South Dakota's state standards. The State legislature appropriated money for development of criterion referenced tests. We had the option to write the tests ourselves or to contract a third party to write the tests for us. This section shares how South Dakota schools used web-based assessments to target the instruction level of each student.

South Dakota has an interesting educational situation caused by the distribution of a small rural population over a large geographical area. There are a total of 176 public school districts. Twenty five percent of the school districts have seventy five percent of the student population. Much of the student population is in the eastern third of the state. How could the state deliver a world class education with so many small school districts?

Governor Bill Janklow recognized the unique situation South Dakota was facing and proceeded to wire every public school classroom with a T1 line. To make this project cost effective, prison inmates were used to provide the necessary labor. A local electrician was hired at each school district to supervise the project. Inmates slept on cots in the school gymnasiums. Many prisoners received job offers after being paroled because of this hands-on technical experience.

At South Dakota's State Department of Education, we've heard many wonderful stories as a result of wiring the schools. One elementary teacher observed an inmate who was approached by two first-grade boys.

One of the boys looked up at the inmate and asked, "Are you one of the prisoners?"

"Yup," was the reply.

The boy asked, "Did you kill someone?"

"No," the inmate replied. "I've never hurt anyone."

Then why are you in jail?" the boy asked.

"Because I didn't pay attention in school," the inmate answered.

According to Governor Janklow, South Dakota is now the best wired place on the planet. But that's only a start. The important thing now is to find ways to use this technology to give students the opportunity for a world class education. One way we're doing this is offering classes over the Digital Dakota Network (DDN) to students of all ages. This two-way audio-video system (V-Tel) is in operation for the 2000-2001 school year. The idea is to provide options for students who might not otherwise have an opportunity for certain subjects.

South Dakota is also the first state in the nation to provide an on-line state wide assessment. We have entered into a strategic partnership with EdVISION Corporation of San Diego, California, to provide an assessment that is aligned to the state content standards. Performance.com, the web-based assessment tool we've adopted in South Dakota, will tell teachers which content standards have been mastered and which need more work. The teacher can click on each standard and get instructional strategies on how to help students master standards. This web-based, computer-adaptive test covers four academic areas: reading, math, science, and language arts. It provides instant feedback to teachers, students and parents. Results are available immediately following the assessment. Student progress over a period of time may be tracked.

These web-based tests are significant alternative assessments to norm-referenced and traditional criterion-referenced tests. They utilize a computer-adaptive model to target the instruction level of each student by altering question difficulty based on previous answers. The reading test, for example, with which we began our statewide implementation of web-based testing, utilizes an expert system to report a proprietary Reading Progression Index (RPI) for students in grades 2 through 12. The test is tailored to each student as the test progresses. The interactive system uses the students' own responses to determine the difficulty of subsequent reading passages and response questions, without continued exposure to either very easy or very difficult questions. The average test time is 30 minutes, although students reading well above their grade level may take more time to complete the test. This means that testing time generally occupied only one class period.

Another logistical boon in web-based testing is that test proctors do not necessarily have to be teachers. The role of the test proctor in web-based testing is to *assist with computer use*, but *not with the test*, itself. Proctors monitor the test environment to ensure optimal testing conditions for all students. If the students are not computer literate in terms of using the mouse and scrolling, the proctor may need to take a little time and demonstrate computer use. Before the students begin tests, the proctors explain the purpose of the test, and describe how the test helps teachers gain information about individual reading levels. Proctors also describe the layout and design of the test, as well as its similarities and differences to types of assessments the students have encountered previously. They assess the students' physical comfort level, their ability to view their computer screens, and their ease with using a mouse. Finally, they follow scripted instructions to guide students through testing startup.

As with any new process, thorough training is key to successful implementation. When South Dakota adopted web-based testing from EdVISION, we asked their Professional Development team to spearhead certification workshops for our Testing Coordinators. Once this core group of our own educators were trained how to get each student to reach their potential using this assessment, they in turn trained proctors at their own school sites. EdVISION staff wrote a Test Coordinator's manual and a Proctor's Manual for us to distribute as part of the certification process. Follow-up workshops will be held in the spring to help teachers and administers interpret test results.

Research studies indicate that feedback is one of the most important motivators of students and teachers. One of the most valid complaints concerning external assessments is the amount of time is takes to get the scores returned. Information that could be used to inform teaching practices is unavailable when during critical times. The web-based testing we've adopted in South Dakota makes scores available immediately following testing. Thus, teachers can utilize the information interpreted from reports to make *immediate* changes in the students reading instruction. Teachers across the content areas can also use the information to determine the needs of students and how performance may be effected in these subject areas as well. Parents can be informed so that they can begin to assist in providing appropriate grade level reading materials and reading along with their child to increase reading comprehension.

While South Dakota was the first to adapt statewide web-based testing, it won't be the last. The new teachers who enter South Dakota and other innovative school systems with a knowledge of web-based assessment will find themselves on the cutting edge of what we're trying to accomplish. They will be able to more quickly embrace this assessment tool to evaluate, maintain, and foster their students' academic achievement.

Terry Bailey: The University Perspective

Technology and Pre-service Teachers

Teacher education institutions are well positioned to provide opportunities for pre-service teachers to learn about becoming successful K-12 educators through content, classroom, and curricular development. As we become a more technology-driven society, it is apparent that teacher education programs must address issues related to computer competency, technology integration, and Internet accountability. Faculty and administrators at Ball State University have used the software described here to introduce pre-service teachers to curriculum alignment and accountability measures. How can we help our teachers enter the field knowing how to align and integrate the skills their K-12 students are required to know?

Faculty and Administrators at Ball State University are using EdVISION's Curriculum Designer and Skills Connection software to show pre-service teachers how to align and integrate the skills that K-12 students are required to know. EdVISION's University Partnership program is designed to allow university professors the opportunity to utilize the software in a laboratory setting at no cost to the university. Students purchase a laboratory pack that includes the product manual, support materials, and product tutorial. The program resides on a group of predetermined computers available to students enrolled in the class. The internal security feature in Curriculum Designer is enabled to prevent unauthorized use of the software. EdVISION provides training for professors to support effective implementation of the products into the college classroom.

The University Partnership Program allows institutions like Ball State University to do the following:

- Introduce the power and the possibilities of electronic design and assessment software through curriculum design projects, classroom discussion, and project development to other colleges and universities at professional meetings and in classroom environments.
- Be a research and development "sounding board" for EdVISION as they further develop their products. Discussions with pre-service teachers in university courses and graduate students who are already working in the education field give us valuable information about how software is getting implemented on the job.
- Offer state-of-the-art facilities for online workshops and communication through 1-way or 2-way videoconferencing, videostreaming via the Internet, and community portals.
- Demonstrate the EdVISION's curriculum design and assessment software to superintendents, principals, teachers, and parents at professional meetings and community forums. We want to show how these products can be used as alignment, accountability, and assessment tools in the educational process.
- Provide ongoing training and support to pre-service and in-service K-12 teachers who are using products like Curriculum Designer and Skills Connection.

Pre-service teachers need experience with the infusion of curriculum alignment software into standards-based curricula. Our University Partnership with EdVISION has allowed us to offer a hands-on course in using curriculum design and assessment software. Participants engage in activities that revolve around the idea that learning a concept involves using technology *in context*. Students understand that setting and following standards are critical components for accountability. Without high standards for what we expect students to know and be able to do, we will not have the kinds of schools we want. Experience and research has shown that high standards and rigorous assessment alone will not guarantee success for all students. For expectations to be met, clear standards must be put into place and followed. The University Partnership program allows pre-service teachers to use software that was designed specifically to help with this implementation process.

Cheryl Reed: The Corporate Perspective

Accountability and .com—can this marriage be saved?

How can schools get the funding needed to ensure student success? If technologies like those discussed here are available to clarify, reshape, and drive our responses to escalating accountability mandates, how can districts get the money needed to purchase them? Are alliances between education and corporate concerns necessarily uneasy ones? Can we teach pre-service teachers and administrators how to get strategic funding?

My company, EdVISION Corporation, has worked with each of the school systems discussed by my co-authors in this article—and, of course, many others--to help them implement reform with software that meets the needs of their specific situations. My colleagues are Ph.D's, Ed.D's, former public school teachers and administrators, and former University professors and writers. In the Professional Development Department alone, we have a combined teaching/administrating experience of 110 years. Our company goal has always been to make possible a coherent curriculum for all students, leading to academic success measured by fair and accurate assessment. In short, we are educators who develop software, not software developers who market to educators.

Part of my enviable position at EdVISION is to connect people with resources. I know where the money is hidden. As Coordinator of Proposals and publications, (and formerly, as Assistant Professor of Writing at Penn State University), I have been consistently amazed at the amount of grant money that's available for educational endeavors. Pre-service teachers need to know that *people have money they want to give away—to us!* At Penn State, I was always the professor who had work study students, new computer software, stipends for overwork, and travel money for conferences. When my colleagues asked me, "How did you get *that?*" I'd say, "I asked for it." In my experience, it was as simple as that.

After many such encounters, I realized that huge amounts of money are available, but *most of us receive very little of it*. There appears to be a built-in disconnect. Why don't more worthy projects get funded? Why do so many proposals seem doomed to failure? After getting my own proposals for educational and publishing projects funded, and helping other people to write theirs, I have some suggestions for pre-service teachers to think about

First, locating grant money takes time out of an already packed schedule. As much as possible, get information coming *to you* rather than going out to search for it. Many foundations, government agencies, and university websites have free electronic services (like the Grants Net Info listserv offered by the Department of Health and Human Services or the Foundation Center listserv) that will update you about grant foci and deadlines.

Second, decide how much time and money you want to invest finding grant money. Do you want to purchase a hard copy of government grants? Of private funding foundations? Books on grant writing? Do you want to set aside Friday afternoons (for example) to surf the web for grants? Do you want to pay a consultant firm to send you grant updates?

Third, find out what your institution already has available to you. Start at "home" with grants tailor-made to your situation, then branch out to larger opportunities. Find out what kinds of listservs, websites, and notification services your institution may have already purchased. Then, use these resources!

Fourth, *apply only to those grants that mirror your goals*. Most of us have a vision that we want to accomplish. We hope that the grant-funding institution can see it "our way." Yet, we have a *much* better chance of success if we analyze what a particular organization wants to fund, and see how our vision fits in with theirs. Think of the funding organization as the larger framework into which your request fits rather than the other way around. For example, if you think technology would solve a problem in your school, but the funding organization warns, "We are not looking for solutions which merely throw technology at a problem," you'll want to describe your project in a way that shows how technology will be *integrated* into the solution. How will your plan prevent the technology you buy from becoming "shelfware"—never utilized or implemented? How will technology help the people who will be implementing your plan?

Fifth, don't let the educator's ingrained shyness about asking for money get in your way. Use a business model when writing grant proposals, *not* a scholarly model. Let's take a close look at the difference between these two models: in my experience, the way you present a project is one of the major factors in whether or not a grant gets funded.

The scholarly model. Many writers--passionate about the school reform they want to enact—simply don't like to ask for money. They prepare their requests for funding the way they would prepare a formal scholarly article:

1) Pose an interesting research question,
2) Support your argument with several references to other scholars,
3) Show how it gets enacted in your own situation
4) *Very gently* suggest a possible conclusion—but leave it open for interpretation and further discussion.

These gentle, scholarly proposals aren't likely to be funded. The people reading them may see you have a real heart for your students, but they will have no idea what it is they are being asked to fund, or why, or how to evaluate whether or not your project has been successful!

The business model. Now let's look at a business model. The writer follows this plan:

1) *State the problem or issue.* State what you want to change in one or two lines. " The Stellar Students Academy needs a curriculum aligned to state standards if we want to maintain our top ranking among schools in this state."

2) *Make a promise.* What will solve the problem? Again, state it briefly—you can expand a bit later. "The adoption of an electronic curriculum will help craft a dynamic set of objectives so that students are taught the objectives on which they'll be tested."

3) *Describe a process.* This is the "this is how it all works" section, and depending on page limits set by the funding organization, it can be from several paragraphs to several pages. Use bolded headers, white space, charts, and other methods that organize material visually. Answer the questions asked in the foundation guidelines. Be able to describe how you'll fulfill your promise in some detail. What intervention is being attempted? Who will be involved? What kinds of changes in teacher schedule, workload, computer resources, etc will this involve? What software needs to be installed? Who will do that? What timeline do you envision for implementation? What changes will have to be made in the existing system, schedule, or budget in order for your plan to work?

4) *State your estimated costs—in work hours and dollars.* Include cost sheets, implementation timelines, technical requirements, and plans for staff development. Will you have to pay the installers or staff trainers?

5) *State evaluation criteria.* What will *tangible* success look like? Why is *this* plan the most likely to achieve *this* goal? Offer a way for outcomes to be measured tangibly—test scores, workshops given, documents produced, parents involved.

6) *Restate your promise.* If this project gets funded, the organization can expect to see---This is important because---

In most cases, grant writers are visionaries pitching ideas to pragmatists. Grant writers see a vision of what can be, and are willing to make whatever changes are necessary to make their vision happen. Grant writers envision transformation, innovation, new ways of seeing. Funding organizations, on the other hand, take a more pragmatic approach. What can work in the present system? How can we gain the most with the least amount of expenditure? Why should we fund *this* project over *that* one? How does this project fit in with our overall foundation mission? If there is any place that the marriage between academe and .com is strongest, it is in grants that propose schools adopt savvy new technologies. Communicating academic funding needs to government and private funding organizations is, in the words of business writer Geoffrey A. Moore, the "chasm" that teachers and administrators attempt to cross when they seek funding for technological innovation in their school districts. If we can help our pre-service teachers understand how to articulate clearly their vision for reform, we will have unleashed dynamic change agents into a school system already undergoing a massive transformation.

Community Innovations for SITE: Who is doing what with Clearinghouses and On-line Tools Development?

David Gibson and Bob McLaughlin
National Interagency Civil-Military Institute (NICI), USA
dgibson@vismt.org, mclaughb@nici-mc2.org

Deborah Sprague
George Mason University Graduate School of Education, USA
Dspragu1@osf1.gmu.edu

Niki Davis and Marv Howard
Iowa State University Center for Technology in Learning and Teaching, USA
ctlt@iastate.edu

Christina Preston
MirandaNet and London University Institute of Education, UK
c.preston@ioe.ac.uk

Gary Marks
Association for the Advancement of Computing in Education, USA
gmarks@aace.org

Abstract: This interactive panel session aims to inform the further creative development of SITE's web sites. It will be particularly relevant to groups within and beyond the USA who are developing "clearinghouses" and/or new "on-line tool sets" for technology in pre-service and graduate teacher education. The session will also consider ways in which SITE can collaborate with related on-line communities.

The session goals are:
- Exchange information and contacts with one another
- Get a better sense of the recent landscapes of on-line development
- Enable participants to envision and form new alliances and partnerships
- Facilitate better use of resources
- Create an atmosphere for more focused planning and deployment of new capabilities
- Open the possibility for broader applications and co-learning among innovators
- Consider collaborative links with leading edge scholarship in technology and education
- Link with the SITE survey of teacher educators' needs and potential contributions

Background

Niki Davis' keynote paper 'SITE: A Site of Educational Leadership for the Emerging Knowledge Society' for this SITE 2001 conference suggests that SITE can model behavior for the emerging knowledge society (in press). Within it she describes the background to this innovative session:

'Most recently, I have begun to lead the further development of SITE's web site to support our objectives of committee and community support. David Gibson of the Teacher Education Network (TEN) PT3 catalyst project looked for collaboration with SITE during the 2000 conference, recognizing what the National Interagency Civil-Military Institute (NICI) web site and tools might bring to enhance teacher education (http://www.nici.org). As a result I have undertaken to lead a needs analysis of SITE membership and to investigate how NICI web tools might be used to support SITE, especially its working committees.

The Center for Innovative Learning Technologies (CILT) conference provided another opportunity to address SITE needs (http://www.cilt.org). Part of the work of the professional development sub-group at that conference resulted in a successful seed grant proposal for SITE-CILT collaboration, which will particularly support SITE membership needs for scholarly collaboration. The convergence of these two small projects and AACE's commitment to web development to support our scholarly community will be an important interactive session during the SITE conference. The goal of the session is to design an ongoing environment to continue SITE committee work arising from meetings of the committee and our new Saturday Town Meeting. The needs analysis is underway. We hope that all SITE delegates will participate in both sections: needs and contributions. The aim is to create a range of complementary synergies between these two, so that all participants benefit. The survey will become available on the SITE conference web site in early 2001 and will inform the redevelopment of SITE's web sites for the conference, committees, and other activities.'

This SITE Session

This interactive panel session is designed for SITE participants interested in developing our on-line community. It will be particularly relevant to leaders of national projects, PT3 implementation and catalyst grants and other groups within and beyond the USA who are actively building or planning to build 'clearinghouses' and/or new 'on-line tool sets' for technology in pre-service and graduate teacher education. The session will also consider ways in which SITE can collaborate with related on-line communities, including CILT's Knowledge Network (http://kn.cilt.org), The PT3 Teacher Education Network project linked with National Interagency Civil-Military Institute (NICI) web site and tools might bring to enhance teacher education (http://www.nici.org), ISTE's Subject Interest Group (SIG) for teacher education. Beyond the USA, MirandaNet provides support in collaboration with industrial sponsors (http://www.mirandanet.ac.uk) for change agents leading the deployment of new technology in school and teacher education in the UK and in the Czech Republic.

This interactive session aims to inform the creative development of SITE's web presence(s), and to do so in a way that does not ignore equity issues in its language and coverage.

The goals of the session are to:

1. Exchange information and contacts with one another
2. Get a better sense of the recent new landscapes of on-line development
3. Enable participants to envision and form new alliances and partnerships
4. Facilitate better use of resources
5. Create an atmosphere for more focused planning and deployment of new capabilities
6. Open the possibility for broader applications and co-learning among innovators
7. Consider collaborative links with leading edge scholarship in technology and education
8. Link with the SITE survey of teacher educators' needs and potential contributions

The discussions will also draw upon SITE's existing web site presences, which are the SITE conference web site and the on-line journal of Current Issues in Technology and Teacher Education. Glen Bull and Jerry Willis jointly edit this on-line journal under the SITE umbrella. However, the content sections within the journal are edited and controlled by the appropriate content association, with the whole publication organized by AACE (http://www.citejournal.org). The first issue of Current Issues in Technology and Teacher Education includes articles that discuss the challenges of on-line publishing. Although this interactive session aims to focus on on-line community development, rather than on-line publishing, similar issues impinge. These include the evolution of appropriate cataloguing (and/or a system of metadata); protocols for collaboration; and robust archiving including multimedia.

Outcomes

It is hoped that the outcomes of this interactive session will prime energetic developments on-line to create better facilities for SITE to support participants' need for their teaching, professional development and research. In doing so care will be taken to build upon web sites and scholarly collaboration, rather than to duplicate them. It is also planned to document these scholarly activities and publish them in academic papers, hopefully including the SITE on-line journal Current Issues in Technology and Teacher Education.

Reference

Davis N.E. (in press) SITE: A Site of Educational Leadership for the Emerging Knowledge Society, In Willis, D.A., Price, J., & Willis, J. (Eds.) *Proceedings of SITE 2001*. Orlando, March 2001, Association for the Advancement of Computing in Education Charlottesville, VA.

Acknowledgements

The scholarly development is supported though the PT3 Teacher Education Network catalyst grant from the USA Department of Education and a seed grant from CILT, as well as participating organizations and individuals. We thank them all.

The role of school administrators in the process of effectively integrating educational technology into school learning environments: New research from the mid-west.

Ian W. Gibson
Department of Administration, Counseling, Educational, and School Psychology
Wichita State University
United States
igibson@twsu.edu

Abstract: The study reported in this paper examines the role of administrators in the integration of technology into the learning environment of three school districts in the mid-west region of the United States. The outcome of the study provides information that will assist school district and building administrators in developing a greater awareness of their role in supporting the use of technology in the instructional environment. School administrators, instructional staff and technology coordinators participated in this qualitative study. Data collection strategies selected for this qualitative study were focus groups and interviews. Conclusions and recommendations derived from these data are presented in the form of administrator role responsibilities.

Introduction

Based on an analysis of research similar to that reported by Stegall (1998), stating that school administrators did not mention technology leadership as an area of administrative responsibility during an analysis of their perceived areas of responsibility, the research described in this paper focuses upon the administrator's role in the process of integrating technology into teaching. This is a topic with a surprisingly short history. Bromley (1998) provided the reasoning for this phenomenon. Rather than starting with a determination of what schools should accomplish and then asking how technology might be used to achieve those goals, Bromley suggests that computing initiatives have most often been based on the attitude, "This technology exists, we've got to have it" – that is, educational computing has largely been technology driven rather than curriculum driven. As a result, putting computers in schools has all too often meant getting more of the same, only automated: electronic workbooks, computerized tracking of student "progress," and so on (p. 128). Given that this situation was once a widespread phenomenon across the country, it is not too difficult to understand the reasons why administrators did not consider deep involvement in this process to be necessary. The fact that many administrators are not comfortable with technology, and have participated in leader preparation programs that did not include reference to or use of technology adds to a lack of administrator involvement in the process (Gibson, 2000; Maurer & Davidson, 1998; Roden, 1997; The Office of Technology Assessment, 1988; 1989; 1995). As greater awareness of the potential of technology to positively impact learning has grown, and recognition of the need to transform the way schooling has occurred has increased, and the variable rates of technology adoption around the country have been recognized, the need for involving the whole educational team in the process of integrating technology has become a pressing reality.

Recent literature on educational leadership has sharpened the focus on technology issues facing educational administrators. The number one issue in the effective integration of educational technology into the learning environment is not the preparation of teachers for technology usage, but the presence of informed and effective leadership. Confirmation of this statement can be found in the literature on professional association web-sites related to establishing technology standards for administrators. Further evidence that what administrators do or fail to do makes a critical difference in the effective use of technology in schools can be found in the national movement to develop technology standards for school administrators. The question, "What should administrators know about and be able to do to ensure successful integration of technology in P-12 schools?" is being addressed by the Collaborative for Technology Standards for School Administrators(<www.iste.org>or<www.cnets.org>).

In his keynote address to the Expert Forum on Technology Standards for Administrators (Denver, Oct. 2000), Latham, Director of Assessment for TeacherUniverse suggested that the key to the technology vision was leadership. With the same thought in mind, standards advocates have suggested that developing national technology standards for school administrators is the beginning of the process of preparing school leaders to be capable and knowledgeable participants in the process of effectively integrating technology into learning environments.

The Research Process

Following analysis of the literature, and recognizing the need for leadership in their own school technology situations, a research team comprising students enrolled in a Master of Education program, specializing in Educational Administration and Supervision, at Wichita State University, Kansas, and a professor teaching in the program, recognized the need to consider administrators' roles in the process of integrating technology into school processes. A research study was designed to address this issue.

The purpose of the study was to analyze the role of administrators in the process of the integration of technology into the instructional environment of three school districts in which members of the study team were currently employed. The data collected were to be synthesized with information gleaned from the literature to form the basis of a guide to administrators interested in enhancing the success of the technology integration efforts of their building and districts.

The study addressed the following questions.

1. When integrating technology into the instructional environment, what is the building administrator's role as instructional leader?
2. What administrator supported processes are necessary when integrating technology into the instructional environment?
3. What building or district level structures are necessary for teachers to effectively integrate technology into teaching?

The research was qualitative in design and incorporated the collection of data using interviews and focus groups with instructional staff and administrators. Instructional staff included teachers, as well as those who were acting in the role of technology consultants for school districts.

The Research Design

The nature of the research, and the research questions implied a need for data to be rich in description, focused on individual perceptions and detailed in the analysis of the topic in question. As such, a qualitative design was chosen to match these expectations. Drawn from a naturalistic approach to educational inquiry (Erlandson, Harris, Skipper, & Allen, 1993; Lincoln & Guba, 1985; Patton, 1990), this study design adopted a discovery-oriented approach to data collection intended to minimize investigator manipulation (Patton, 1990). Data collection strategies able to provide the richness of data and the variety of perspectives necessary to understand the complexities of the situation under study (Erlandson et. al., 1993) were selected. The need to gather data on this topic using a variety of approaches was also necessary to support the trustworthiness of the data collected. The study team adhered to the need to triangulate the data collected (Lincoln & Guba, 1985) and increase the credibility of the findings through the use of focus groups and interviews. Teachers were randomly selected from each of the three schools to participate in one of three school-based focus groups. Focus groups were conducted when a minimum of six teachers agreed to participate. Principals and technology coordinators from each school participated in interviews. With the permission of all participants, each data collection activity was audio-taped to assist in accurately capturing all responses. Data from these activities were unitized (Erlandson et al., 1993) and subjected to the process of constant comparative analysis advocated by Lincoln and Guba (1985). This process was assisted by the use of a relational database allowing repetitive manipulations of the data until naturally occurring themes and categories emerged. The themes and categories created the framework for analysis of the administrator's role in technology integration.

Research Results

Categories and themes emerged during the data analysis process, indicating the areas of greatest concern for the respondents from these three mid-western school districts. Comments from study participants clustered around common themes related to existing practices, planning, curriculum issues, resources, staff issues, communication, support, obstacles, professional development, and implementation. These emergent themes have been maintained in the organization of the recommendations for school administrators presented below. Each statement is designed as a recommendation that all school administrators should follow.

1. Existing Practice
Become aware of existing practices in the building, in the community, and in the outside world
Support teachers and students enthusiastic about technology usage
Recognize the time investment of technology users
Celebrate all technology achievements

2. Planning
Ensure a current inventory of hardware/software/infrastructure
Document current technology practices
Be aware of teacher skill levels
Establish a Technology Planning Committee
Develop a shared vision for technology in which everyone has an active role.
Support the development of an evolving five year technology plan which includes a vision, mission, funding, goals, roles, timelines and responsibilities
Re-evaluate and update the technology plan annually
Incorporate technology into the school improvement plan
Encourage research, risk taking, and dreaming when planning and integrating technology.

3. Curriculum Issues
Provide support and time for analysis and planning for integrating technology into curriculum documents
Encourage and structure collaboration on, and communication of technology curriculum issues, changes and techniques throughout the district/building
Provide opportunities to visit other schools to evaluate alternative approaches to curriculum integration
Provide access to documents, expertise, and ideas about technology and curriculum integration issues

4. Resources
Be aware of the need for resource allocation in the areas of hardware, software, finance, access to information, training, time, technology support personnel and planning.
Develop an inventory of district and building level equipment
Create an awareness of technology needs as they relate to the achievement of student learning goals
Support budget decisions tied to the establishment and maintenance of technology configurations and personnel sufficient to support the needs of teachers and learners
Provide time for teachers and administrators to think about and learn to use technology effectively
Collaborate in the development and maintenance of district and building level technology plans
Be a financial advocate for teachers technology (hardware, software, training) needs
Utilize business expertise, community partnerships, and grant opportunities to support technology needs

5. Staff Issues
Become familiar with staff technology issues and needs at the district and building level
Address concerns related to teacher expectations, training, building and district support personnel in a timely and proactive manner
Support teachers as they struggle with integrating technology by recognizing frustrations and offering solutions, personal assistance and expertise
Design support structures and solutions for specific situations and needs
Employ a technology specialist whose primary responsibility is to support classroom teachers
Provide opportunities for identified teachers to participate in specialized training to develop teacher-based technology leadership in the school
Encourage the development of, and use of student and teacher expertise in supporting school technology goals

6. Communications
Communicate the district/building technology vision and plan to all stakeholders
Communicate past successes and new initiatives to all stakeholders
Communicate the need for continual technology change and school improvement, and its connection to learning.

Ensure mutual understanding and buy-in for district/building technology visions
Formalize communication between technology personnel at all levels, teachers, and administrators

7. Support

Provide funding for on-site technology support personnel
Actively listen to and respond in a timely manner to technology problems in the building
Be the voice between teachers' technology issues and the district office
Actively encourage teachers to incorporate technology into their classroom
Empower the staff to correct their own technology problems
Increase support staff as the use of technology is increased
Become aware of and use community technology resources

8. Obstacles

Find additional funding through grants, capital outlay, and other resources to supplement technology purchases and technology support mechanisms
Provide time for grant writing, technology plan development and maintenance, planning and conducting professional development, and learning how to implement technology into the classroom
Insist on consistency of computer configurations –hardware/software, infrastructure
Be aware of the reasons for and the various forms of teacher resistance
Develop appropriate incentives for teachers to be involved in implementing technology
Change attitudes within the district/building which lead to a reticence to provide financial support and professional development for technology integration
Be aware of and overcome technology related logistical problems within the school (e.g. wiring, power, space, security, etc.)
Be prepared for administrators and teachers unable to adjust to the change technology brings to education
Be prepared to constructively deal with 'educator fear of technology'
Have specific resources and techniques available for those experiencing difficulty integrating technology into the curriculum

9. Professional Development

Assess teachers' technology needs
Allow staff input into in-service topics prior to making decisions
Plan various types of professional development experiences
Provide time for on-going, results-based professional development
Provide time for collaboration on lesson planning, class implementation issues, and learning about hardware and software with other staff members
Hire an on-site technology expert to mentor the staff
Allocate sufficient funding for high quality professional development
Protect professional development budget allocations
Support staff risk taking
Model technology usage and risk taking

10. Implementation

Provide the opportunity for co-workers to collaborate
Allow staff time for implementation
Schedule on-going professional development sessions
Champion the technology vision so parents, teachers, and students see the relevance of technology to their learning processes
Develop staff buy-in to the technology vision
Incorporate technology into school goals
Allocate budget authority to support the technology vision
Provide time for staff to learn how to integrate technology

Conclusion

The results of this small study describing the perceptions of teachers, technology coordinators and administrators in three mid-western school districts in the United States mirror much of the material found in current literature on the topic. This study confirms the importance of an administrator's role in this process. In similar fashion, Mahmood and Hirt (1992) concluded that of all the variables impacting the integration of technology into schools, none was as important as support from school and district administrators. In describing goals necessary for creating a technology-effective, and integrated learning environment, McPherson (1995) focused upon the crucial role of school leaders and the need to create dynamic leadership and organizational support for the process. These and other writers have recognized that a key barrier to the use of technology in schools is the lack of administrative support (Maurer & Davidson, 1998; OTA, 1988, 1989, 1995; Rodin, 1997). This study has confirmed that administrators need to know how technology can restructure the teaching learning process and the importance of their role in the process.

Other writers have provided guidelines to assist administrators in successful technology implementation. These guidelines reflect the findings of this study. Stager (1995) suggested that administrators: work with the living; eliminate obstacles; stay on message; work on the teacher's turf; plan off-site institutes; provide adequate resources; avoid software du jour; practice what you preach; celebrate initiative; share learning stories; help teachers purchase technology; and cast a wide net (p. 80). A further pair of goals are provided by Meltzer who suggests that technology should be used in conjunction with greater emphasis on learner-centered pedagogical strategies, and that it must be integrated into the fabric of the school program" (p. 23-24). The research reported in this paper has suggested the need for a greater emphasis upon the role of school administrators if the investment in training teachers to integrate technology effectively into learning environments is to be fully realized.

References

Erlandson, D.A., Harris E.L., Skipper, B.L. & Allen, S.D. (1993). *Doing Naturalistic Inquiry: A guide to methods.* Newbury Park:Sage.

Gibson, I.W. (2000). *At the Intersection of Technology and Pedagogy: Considering Styles of Learning and Teaching.* ERSC Seminar Series Paper, University of Keele: United Kingdom.

Lincoln, Y. S., & Guba , E. G. (1985). *Naturalistic inquiry.* Newbury Park, CA: Sage.

Mahmood, M.A., & Hirt, S.A. (1992). *Evaluating a technology integration causal model for the K-12 public school curriculum: A LISREL analysis.* (ERIC Document Reproduction Service No. 346847)

Maurer, M.M. & Davidson, G.S. (1998). *Leadership in Instructional Technology.* Columbus, OH. Merrill.

McPherson, Sarah. (1995) Technology for educators: A graduate program for research and practice. *Technology and Teacher Education Annual.* Houston, TX: Association for the Advancement of Computing in Education.

Meltzer, J., & Sherman, T. M. (1997). Ten commandments for successful technology implementation and staff development. *The Bulletin, 81*(585), 23-32.Office of Technology Assessment. (1988). *Power on! New tools for teaching and learning.* Washington, D.C.: U.S. Government Printing Office.

Office of Technology Assessment. (1989). *Teachers and technology: Making the connection.* Washington, D.C.: U.S. Government Printing Office.

Office of Technology Assessment. (1995). *Linking for learning: A new source for education.* Washington, D.C.: U.S. Government Printing Office.

Patton, M. Q. (1990). *Qualitative evaluation and research methods (2nd ed.).* Newbury Park, CA: Sage.

Rodin, John. (1997). Training school leaders to be technology leaders. *Technology and Teacher Education Annual.* Houston, TX: Association for the Advancement of Computing in Education.

Stager, G. S. (1995). Laptop schools lead the way in professional development. *Educational Leadership, 53*(2), 78-81.

Stegall, P. (1998). The Principal – Key to Technology Implementation. Presented at the 95th annual meeting of the National Catholic Education Association (Los Angeles, California, April 14-17, 1998). p. 1-13.

Acknowledgements

The author wishes to recognize the contribution of students in the Master of Education program at Wichita State University who have collaborated on this research project: Bill Faflick, Kasey Frost, Jeff Hersch, Jill Lachenmayr, Doug Mann, Shawn Morris, and Don Tolar.

Instructional Technology as a Support System for Principal Certification

Dr. Cathy C. Kaufman
Administration and Leadership
Indiana University of Pennsylvania
USA
ckaufman@grove.iup.edu

Abstract

This session describes the creation of an electronic learning community for candidates in one Principal Certification Program. Individual web pages using a template to match program objectives enabled students to incorporate the Internet as a window through wich to look in on the internship learning experiences of other aspiring administrators.

Technological Needs

Lou Gerstner, CEO and chairperson of IBM, claims that nothing matters more for the future of American schools than finding great principals to lead them. . But like most organizations, schools are experiencing major transformations in the way they have traditionally conducted business. Although the role of the school administrator is commonly cited as the central to such changes, this role itself is in the midst of major transition. It requires institutes of higher education to rethink the preparation of a new genre of educational leaders who can effectively connect curricular, technological, and community needs. This project describes the creation of an electronic learning community for candidates in a Principal Certification Program at Indiana University of Pennsylvania who, by virtue of their age rather than their credentials, frequently have fewer electronic experiences than those for whose instructional supervision they are accountable.

Learning Objectives

The change that having a web page window and custom designed template geared to program competencies brought to this program reflects the distinction between technology being an "informating" (Zuboff, 1988) rather than an automating tool. Automating technologies make existing work more efficient. Informating efforts, however, stretch people to first think differently about the work they do and then to redesign that work. Most aspiring principals in this program have high levels of competence in the automating components of their professional life such as computerized grading, course scheduling, manipulating demographic transportation data, budgeting, and integrating computer assisted learning. Using the Internet in an informating way, however, set the stage for principal candidates to learn from each other's experiences during their supervised internship in a way that had not previously been possible. Until this change, students in a program that is performance-based followed their university course work by returning to their school districts to complete an administrative internship. The collaborative relationship and the important network of conversation recognized as central to adult learning traditionally ended in transition from university to public or private school environment. Web Pages enabled these aspiring administrators to have a window into the internship experiences of their classmates thus providing greater opportunity to sustain the benefits of collaborative learning that benefits both individuals and the organization of which they are part.

Ideals central to collaborative cycles of deep learning (Senge & Kim, 1997) mesh well with the Principal's Program at Indiana University of Pennsylvania that is anchored in applied leadership in action. Students fulfill program goals and state certification requirements through enacting actual improvement in their school districts in the six areas of: curriculum management, instructional supervision, organizational management, evaluation and research, technology and innovation, and human relations. The development of a template reflecting students' experiences in each of the six performance categories expanded our use of technology in the program itself and built a more synergistic element into the program in which an individual experiences add value in term of the more informed practices for the entire group. Throughout a seminar in School Administration, candidates formulate projects in each of the program's six core competency areas. This resulting Action Plan must meet the approval of the candidate's on-site mentor and must therefore reflect attention to the context of the school district in which the student completes his or her internship. The Action Plan addresses specific university and state requirements, but with enough flexibility that the circumstances and challenges of a wide variety of school districts fit constructively within the framework.

- Curricular projects must address standards and changing assessment instruments, the inclusion of special needs students, and the match of school curriculum to the workplace.
- Instructional Supervision projects require implementing useful staff development workshops and exploring supervisory techniques go beyond inspection oriented checklists and that differentiate in opportunities for

ongoing professional growth for both experienced and novice teachers.

- Research and Evaluation projects require principal candidates to present to an audience a report on student achievement, to develop a grant proposal, and to design, conduct, and report on survey research that address a local educational concern.
- Human Relations projects must bring the community into the school environment to provide insights into how teachers and students spend time together. A parallel project in this area must demonstrate the candidate's leadership in facilitating service learning in which students address a community need. And one of these projects must incorporate the issue of school safety.
- Technology and Innovations requirements involve regular electronic communication with faculty supervisors, participation in district technology committees, proposing a plan to upgrade technology training needs, and using the Internet to explore school leadership sites.
- Candidates must demonstrate an understanding of the Organizational Management of schools through a working knowledge of collective bargaining procedures, maintenance of custodial responsibilities, work schedules for special teachers, building compliance with safety codes, school emergency plans, transportation scheduling, master scheduling, budgeting, disciplinary codes and school law.

This well-defined but flexible infrastructure provides a program architecture that integrates the capacities and beliefs of a diverse group of veteran educators who share common administrative goals.

A Cycle of Deeper Learning

Our approach to the informating dimension of technology also reflects a "deep cycle of learning" (Senge & Kim, 1997) that successfully integrate opportunities for capacity building, practice, and further research. Personal home pages enable candidates to share projects through which they are mastering the previously described competencies. This builds an electronic window through which they can learn from both novice and experienced school administrators. Their administrative capacities are thus vicariously expanded into environments in which they have no direct personal involvement but the opportunity to scrutinize the successes and the struggles of their peers. Access to an electronic resource base that parallels the program's six competency areas enhances the research element of deeper learning cycles within this learning community. This insures that aspiring principals will have electronic as well as traditional research and literature from which to expand their knowledge during the required period of internship.

Conclusions

In the transition from experienced teacher to novice administrators. reconfiguring traditional portfolio documentation of core competencies in the program enabled aspiring principals to

- keep pace with current changes in curriculum, supervision, and school law,
- share strategies for dealing with contemporary school and community challenges,
- empower peers and staff members through providing greater access to information and to each other.

References

Gerstner, L., Semrad, R., Dole, D., & Johnston, W. (1994). *Reinventing education: Entrepreneurship in America's public schools*. New York: Dutton.

Senge, P. Kim, D. (1997). From fragmentation to integration: Building learning communities. *The Systems Thinker* 8 (4), 1-5.

Zuboff, S. (1988). *In the age of the smart machine*. New York.: Basic Books.

Managing Change
To Flexible Learning Using Online Technologies: Bridges To Cross, Lessons To Learn

Marie Kavanagh
Dip. Teach, B. Comm, Grad. Dip Adv.Acctg, MFM
Senior Lecturer,
Department of Commerce,
The University of Queensland (Ipswich Campus).
m.kavanagh@mailbox.uq.edu.au

Abstract: Universities around the world are involved in dynamic change as they seek to take advantage of the potential of the internet and information technology to provide learning opportunities which are independent of time and location. They must develop creative solutions in order to cope with changing educational requirements in an increasingly demanding global market. Yet many of the early attempts to use information technology and the internet for teaching have been nothing more that unreflective rebadging of material or repackaging of the more traditional modes of learning. To be successful, effective educational methodologies need to be anchored to the diverse material circumstances characterising different groups of learners. The challenge for universities offering programs of study is to provide avenues for learning which are reflective of the needs of its 'learning community', take advantage of the benefits which information technology provides while keeping in mind the outcomes desired for programs.

One of the more significant responses has centered on the development of educational programs for flexible learning. The philosophy underpinning this new mode of learning goes beyond a traditional, narrow, delivery/teacher focussed approach, to one which encompasses an educational philosophy and a set of strategies, designed to center around the learner by encouraging flexible, interactive learning using a variety of media and technologies. This approach has resulted in a radically different tempo with both educators and students being plunged into a new educational environment which requires different mindsets and methodologies.

This paper is an analytical reflection on the policy and management issues necessary to champion a change to flexible learning. It highlights the bridges that will be crossed when redesigning and developing programs across a number of disciplines to increase student access to a wide variety of stimulating learning resources and delivery media. It discusses the resources and structures required to achieve what is often a significant cultural shift and changing of mindsets for parties involved. More importantly it describes lessons to be learnt along the way.

INTRODUCTION

Over the last two decades there has been a steady roll-out of new information technologies such as multimedia-capable computers and CD-ROMs. The rapid growth of the internet has resulted in enthusiastic claims for technology's ability to provide high quality education for all. As such, educational institutions worldwide are experiencing a period of unprecedented change, a paradigm shift as they are encouraged to go virtual with implications for the manner in which information technology is incorporated into educational programs. This paradigm shift involves "the rejection of one set of values and ideas about education and the adoption of a new set with regard to what constitutes effective pedagogy" Schubert (1986). Underlying this paradigm shift is an emphasis upon the student, how the student learns and a move from content delivery to the process of learning the content. In order to fully exploit the potential of online technologies to allow learners meaningful and effective participation in the emerging knowledge economy, educational communities, which include both teachers and students, need to make major adaptations and innovations in teaching and learning approaches.

The primary result of advances which have been made in various technologies is that educational institutions worldwide are rapidly embracing more flexible modes of program delivery. Images of students sitting at rows of desks where the teacher at the front of the classroom is the focus of attention as the conveyor of information to be copied down, memorised and then reproduced for exams are fading. The use of IT allows for a high degree of diversity in terms of learning activity, methods of interaction and collaboration with others, as well as reflection, areas which have been identified by learning theorists such as Biggs & Telfer (1987) and Laurillard (1993) as key aspects of learning. This facilitates the need for more learner-centered approaches to course design and delivery which increase student access to a wide variety of stimulating learning resources and delivery media rather than teacher-centered approaches. Importantly, while innovation is a key, any educational program must continue to provide suitable training and education for students such that they are "workplace ready" upon graduation.

Educational institutions are not just vehicles of instruction. A university for example, as a state of mind means social and cultural interaction and students will go to great lengths to socialise with each other in good old fashioned real reality. Before embarking down the 'cyberschool' trail there is a need to clarify for both staff and students what is meant by terms such as flexible learning and flexible delivery. Dissatisfaction may occur if staff are not properly trained and merely try to translate existing teaching and learning practices to a new medium (Daunt, 1997). Students entering courses that have been advertised as being delivered via electronic platforms to allow flexibility will have certain expectations as to the extent of that flexibility and what it means for them and the resources that will be available to them. It is important to note that some of expectations may be unrealistic.

Effective use of technologies in educational programs requires more than just an automation of existing practices. It should involve planning to generate online teaching strategies designed to ensure learning results in a 'change in understanding' (Alexander, 2000). For many this involves a significant cultural shift for both the teacher/instructor and the student. The appointment of suitable leaders to champion and manage this shift is critical to the successful transformation of programs from traditional to flexible methods of teaching and learning. The availability of a suitable level of resources and infrastructure from the outset to support and assist programs undergoing change, particularly in terms of staffing levels, will also have a marked impact on the quality of programs which evolve.

The first section of this paper highlights the need to understand the model of flexible teaching and learning to be adopted within a particular educational institution; the second section reflects on policy and management issues which arose as part of the process of shifting the paradigm in order to develop and deliver programs on a hi tech, flexible learning campus in one of the departments involved; and the third section looks at the process which evolved in order to design subjects for a flexible learning environment.

UNDERSTANDING FLEXIBLE TEACHING AND LEARNING

It is generally accepted that there appears to be variation and a deal of confusion surrounding the interpretation of the terms 'flexible learning', 'flexible teaching' and 'flexible delivery'. In fact all of these terms are interrelated and should be integrated into programs in varying degrees to cater for specific requirements of programs and to achieve the best possible learning outcomes for students in an environment which allows them choice according to their own circumstances. At the same time the knowledge resources and skills capabilities of academic staff involved in the process needs to be considered so that staff may guide and manage within the bounds of their own comfort zone. Underlying the whole process should be a sound pedagogical justification that the innovations promise benefits and that the changes to the status quo are desirable.

Some research shows that the more traditional forms of delivery (lecture/tutorial/oncampus attendance) are no longer meeting students' access needs and preferences whereas technology based delivery frees students/learners from the time and place dependency of traditional delivery methods (Bates 1995, McCann et al, 1998; Owston, 1997). One of the most significant challenges for program designers and developers is to ensure that programs are developed to incorporate the requirements of 'flexible delivery' and 'flexible learning'. There is a tendency by some to use the terms interchangeably. However a clear understanding of both terms is necessary before effective program development can begin. Cunningham et al (1997) suggest that if the focus of programs is to improve student learning by enhancing the learning of experience and not merely to use different techniques or technologies to deliver content then:

> It is important to distinguish flexible learning from flexible delivery …The former implies a focus on the core activity of education, the learning Process of the individual student, and student choice regarding the methods Employed in that process. By contrast, flexible delivery is an administrative Term which implies a focus on the modes in which content can be distributed So as to relieve students of the time/place/space determinism of on-campus Education, and on administrative systems which respond to consumer needs.

Flexible delivery has been seen by many as the white knight of educational training (Kay, 1997). In its true form it allows students the ability to enroll at any time and start learning straight away, regardless of location. The concept of semester is no longer applicable. It is replaced with "continuous enrolments" to allow the student to participate in learning at any time from home, work or a study center, or anywhere. The focus is squarely on individual learning. Brown, 1997 claims that students will benefit from taking a more active approach to their learning and will increase their self discipline. The use of computer-mediated communication systems can extend and support active, purposeful learning. Computer networks empower connectivity and communication and allow learners to define their own paths through the learning material (Nikolova & Collins, 1998). They also enhance group work by producing an interchange of ideas, increasing the level of dialogue and negotiated solutions between learners (Light, 1993).

Boud, Bridge and Willoughby (1975) and Fenwich (1985) discuss individualised learning in terms of the five degrees of freedom that students should be allowed in learning: freedom of content, method, pace, sequence and assessment. Being mindful of 'designing learning experiences to fit the context of the media to be used, including the value of interactivity, the incorporation of visual material' (Benson & Vincent, 1997) to cater for individualised learning, in this paper the term 'flexible learning' rather than 'flexible delivery' is preferred. Technology is used primarily to support learning and to provide more effective learning experiences rather than deliver 'off campus'.

The concept of flexible learning described in this paper lies along the continuum between traditional face to face lecture/tutorial in-class methods and distance/open learning methods. Programs developed involve a number of flexible modes of learning. Students may choose to access material in a variety of ways. New technologies are used to create communities of learners who can interact and communicate electronically with each other and with teaching staff at any time of day from any place; to allow increased dialogue where learners can clarify, challenge and build on ideas and concepts and see the relationships between them (Laurillard, 1995). At the same time student self access to learning resources is combined with face to face group sessions incorporated into programs throughout the semester to allow students to work collaboratively in small groups and workshops to regularly reflect on their learning. Assessment also involves different modes. Students are expected to be able to analyse, to synthesise, to reflect, and to abstract meaning. Mere tests of retention are no longer suitable. Students are required to participate in group sessions, use the bulletin board, complete interactive quizzes on the subject sites and undertake formal exams.

POLICY AND MANAGEMENT ISSUES

At the outset the shift from one mode of teaching and learning (traditional face to face) to another (flexible learning) presents a significant change and challenge. The extent of such a change will result in the need for more resources (time, money, effort), a planned vision for the future, and a degree of resistance (Carlopio, 1998). The key to successfully managing this challenge is a well planned and executed system of action. Mouritzen, (2000) outlines four measures of management which are critical: Processes and Products, Employees (staff), Customers/Clients (students), and Technology. These four components are discussed below.

Processes

What is particularly relevant to managing a change of this nature is a systematically planned and coordinated approach (system of action) at both the macro (institution) and micro (department/school) levels. At the outset the move needs to have the full support of the institution, be centrally driven and appropriately funded, with facilities and resources made known. These facilities and support units should include a centrally funded academic support unit which comprises a team of instructional designers and educational multimedia services personnel. This unit provides services across all departments/schools to assist academic staff to develop programs by combining knowledge of teaching and learning with an understanding of the educational potential of new technologies (Brown & Grigg, 1999). Imperative to the ongoing success of programs being developed and delivered is a centrally funded, responsive information technology (IT) section to service the needs of both employees and clients.

At the department/school level a program director (or program champion) needs to be appointed to oversee the development of programs or courses. It is the role of this person to champion change and ignite innovation (without overselling it); to manage time frames, budgets and costs; to ensure academic staff are supported in their endeavors to move from one mode to another in terms of time, training and resources; to ensure that programs developed are educationally sound; and that plans for the introduction of technology into teaching are made judiciously and driven by the 'learning' agenda rather than by technology (Alexander, 1995). This person acts as an interface between central administrative committees and staff involved in developing programs, must possess sound facilitation and management skills and plays a pivotal role in the whole process.

Implications for students(clients) and staff (employees)

Trigwell (1998) suggests that the effectiveness of particular teaching strategies is highly dependent upon a range of factors such as context of learning, the teacher's conception of learning, the planning and design of the learning experience (objectives, assessment) and the characteristics of the learners themselves. Moving to effective technology based teaching requires a shift in the teaching and learning approaches that are used if successful outcomes are to be achieved. This will often entail an adjustment for both staff and students. Staff move to become learning facilitators or mentors away from the traditional role of dispensers of knowledge. The emphasis shifts from content to concept and outcomes. This often involves an unsettling of strongly held convictions about the manner in which they teach and embrace learners in the learning experience. "Tried and true 'instincts' honed in years of teaching experience are not necessarily transferable online", (Benfield, 2000, p.1). It also involves enticing them to move away from sometimes erroneous presuppositions about what flexible learning using information technology entails to encompass a broader perspective which involves a multi modal approach to content delivery and learning. Many staff are naïve and assume that the task is one of simple conversion of existing programs and designing programs for flexible learning is easy. This is not the case. Programs need to be reconceptualised using additional resources (Phillips, 1998) and greater interactivity (Lander, 1999). There is a need to ensure that academics 'hasten slowly' and are not expected to move too far too soon in terms of embracing change and new technology.

The move to more student-centred approaches to program design and delivery methodology in education has focused desired outcomes on the students' abilities to think critically, solve problems and work collaboratively. Laurillard (1993) argues that the learner, through active participation in both arriving at, and articulating their personal understanding of new ideas and concepts, constructs knowledge. Students must become "self directed students… keen and capable of setting their own goals and standards with or without help from experts. The appropriate teacher function here is that of consultant and resource person" (Berge, 1998, p.1). It also requires a degree of trust from both staff and students. Staff need to trust that students will take responsibility for their learning and achieve satisfactory outcomes; students need to trust that this approach to learning will provide them with satisfactory outcomes. (Luck, et. Al, 1998). There also needs to be an assurance that students too are not moved too far, too soon in terms of embracing new learning methods which rely primarily on web based methods.

Flexible learning programs are both more labour intensive for staff and very demanding for students as they are expected to become more responsible for their own learning. With the introduction of flexible programs, students will have to grapple with the intricacies of bulletin boards, online quizzes, WWW discussion groups, self-access to learning resources. There should not be an implicit assumption that students possess the necessary learning and technical skills to enable them to cope in a collaborative online learning environment. Students will possess different levels of experience in relation to working in groups and level of computer skills. The first activities in programs should be designed to build group cohesion and coach computer skills involving the use of e-mail, WWW and WebCT.

There should also not be an implicit assumption that staff possess the necessary time and skills to develop and deliver quality programs and make informed choices about appropriate learning strategies, mix of delivery mechanisms and appropriate use of technology (Lundin, 1997). Many teachers lack confidence in using technology and should be encouraged and assisted to view technology as a device to enhance exploration and learning not just an additional thing to include in workloads. A change of mindset should be constructively effected.

In order for programs to succeed it is imperative that appropriate training and guidance be provided for both students and staff. Staff will require support from instructional design and IT teams to assist in the design and development of subjects. Training for both staff and students to enable them to manage new technologies becomes a critical issue. For example, sending messages is far more permanent than talking; interaction and communication online requires different skills i.e. there is a need to have something to say before you say it. Dealing with the daily deluge of online correspondence is a skill in itself. Self paced training manuals need to be developed to coach both staff and students in the use of new technologies and methods of learning. Hands on training sessions pitched at different levels of expertise are essential. Orientation programs should be designed to explain the complexities of an online teaching and learning environment. Students need guidance in the 'appropriate' use of online communication tools such as bulletin boards and chat rooms.

Choosing the Technology

Using the most appropriate technology to get the message across is often the hardest hurdle to cross. Brown & Teague (1998) argue that living in this technologically rich information age, it is hard not to be lured by the dazzle of technology. The danger is that program developers are attracted to technology for technology's sake. Developers should not lose sight of those questions of fundamental importance to the business of education and ask instead "what do I want my students to learn and what delivery options will best help them learn it"? Evans & Deschepper (1998, p.358) suggest that "Online can be many things. It can range from simple email contact to video conferencing. It can include chat sessions, frequently asked questions, bulletin boards. It can be technology rich, interactive CD etc. What it is NOT is a replacement for human interaction and face-to-face contact".

Program designers need to bear in mind that technology is merely the medium of delivery not an educational end in itself. Programs should be designed to include appropriate learning strategies and mix of delivery mechanisms to:

- cater for all the learners' needs
- accommodate the requirements of the subject matter
- take account of the lecturer's expertise and choices and
- ensure the feasibility of reaching learners where they are at no 'additional' cost per person.

Alexander (1998) suggests that we should decide to use technologies such as multimedia or the WWW only when that use provides new opportunities for students to learn – to visualise, to understand, to see complex relationships in ways that are not possible using any other media. The aim of the new technologies should be to promote independent, self-motivated learners. They should be capable of initiating, selecting and using appropriate strategies for acquiring, retaining and transferring knowledge.

The major advantages of the internet for improved learning are in the potential for interactiveness, the access to world wide resources and the possibility for flexible learning styles. Owston (1997, p. 29) identifies that 'the key to promoting improved learning with the Web appears to lie in how effectively the medium is exploited in the teaching and learning process'. However there are situations where delivery over the internet may not be the best option e.g. if you want students to follow an intellectual argument then the printed page is probably best; if you want them to follow a visual process then a VHS tape may be superior to a video clip which takes considerable time to download.

Products/Programs

The approach underpinning the design of educational programs for flexible learning should emphasise active and collaborative learning rather than the traditional one-way flow of instruction; should allow students choice in how, what and when they access and study a range of learning resources; and promote regular communication and interaction with their teachers and with fellow students. In addition, surveys of various academic stakeholders and discussions with industry should be undertaken prior to embarking on the program design. For each subject a team of writers is assembled including the staff member responsible for each subject, a research assistant in the area, an instructional designer and an information technology support person. All writers involved in the development of subjects are required to attend training sessions to assist them with subject design and development skills and the use of web courseware. Regular meetings of writers involved in the development of subjects for the whole program are held to discuss a variety of issues. These meetings allow for an interchange of ideas, an integration of content across subjects and a support base for those involved in the design and development process.

The Process of Designing and Delivering Programs

It is important to remember when designing subjects that the pedagogical background of subjects may differ. So too, may the mindset and skills level of the teaching staff member in charge of each subject vary. Teaching staff must be confident that they can cope with the manner in which the subject is designed which includes an understanding of the capabilities of the courseware used so that they can manage the subject effectively. Five processes or stages became evident when developing and offering programs for flexible learning:

- **Development** - The development phase involves two stages: During the first stage staff need to engage in a collaborative and dynamic approach to planning and designing curriculum. This involves working together to ensure subject content builds knowledge progressively.

  Stage two involves making decisions about the learning model to be adopted in individual subjects. This stage raises issues concerning the notion of academic freedom, the level of maturity and skills of students to cope with new learning methods and technology and the availability of resources to cater for innovation. This has implications for the subject resources which will be included as part of the writing of the subject. It is important during the development stage that pedagogy and not technology governs the overall process.
- **Delivery** –The subject is offered to students using the new delivery methods and technologies. It is useful, but not essential, to have the academic staff member who led the development team coordinate and/or deliver the subject for the first time. If this is not the case, what is most important is that the staff member responsible be totally informed and comfortable with all teaching and learning modes which have been incorporated into the subject and be competent in terms of the use of the technology. Depending on the amount of traditional contact (face to face), which has been included in the subject, it is usually critical that student access to subject sites is linked to enrolment in the program i.e. as students enroll in the subject they are granted access to the relevant subject sites. This is particularly relevant in subjects where there is very little face to face contact so that students may access and begin using material immediately. Instruction for students about navigating each subject site is essential.
- **Evaluation** - The effectiveness of each subject in the program must be evaluated by using the standard evaluative tools provided by the university. Where these are not appropriate and/or do not fit the new teaching and learning model adopted, individual instruments must be designed. These will include teaching and subject evaluations, contextual tools which measure the subject's effectiveness against similar subjects, and representative student and staff focus groups which discuss the strengths and weaknesses of the subjects offered for the first time.
- **Refinement** - At the completion of the first semester of offer, as a result of feedback from students and academic staff, adjustments and improvements are made to each subject with assistance from instructional design and IT support members of the team. Subject sites need to be updated to ensure material is current.
- **Maintenance** - This process will continue for the duration of the life of subject. Each year modifications made necessary by external changes in government requirements, technology upgrades, etc will occur. The end result is one of ongoing improvement to ensure that subjects delivered remain at the cutting edge in terms of content, flexible learning methods and technologies.

It is important to note that the amount of staff time necessary to complete each of these processes will depend upon the nature of the subject and the length of time the subject has been running. Staff workloads need to be adjusted to enable appropriate attention to each of the stages involved in designing and delivering programs online.

CONCLUSION

In summary, while the move to flexible learning using online technologies presents great opportunities, potential for exciting innovations and generally produces better learning outcomes for students, it also presents great challenges. The potential of information technology and the internet to create communities of learners across boundaries will continue to have a significant effect on the design of educational programs worldwide. The object of the lesson is to ensure that the integration of information technology into programs is premised upon learning and interaction and not just delivery of information and that the process of designing, developing and delivering programs is structured and properly managed. In the end effective and exciting teaching and learning require both staff and students to learn new skills, to cross bridges, to challenge and be challenged. The learning curve is often very steep. Making implementation a fulfilling experience for all concerned involves a systematic and comprehensive approach which balances the needs of the organisation with the needs of all the individuals involved in the process. The goal should be to achieve an appropriate balance of technical and professional support which enables both staff and students to use the new technologies to achieve enriched learning experiences in an environment which is complex and demanding.

BIBLIOGRAPHY

Alexander, S. (2000). "Teaching Online: Repackaging or Rethinking Learning" in Proceedings of *Moving Online* Conference, 18-19 August, 2000, Gold Coast, Australia.

Alexander, S. (1998). "Opportunities and Challenges for education in the technology age" in Proceedings of the International Conference, *Learning Together - Collaboration in Open Learning*, Perth, Australia.

Alexander, S. (1995). *Teaching and Learning on the World Wide Web*, AusWeb 95 Conference paper. http://www.scu.edu.au/sponsored/ausweb/ausweb95/papers/education2/alexander/

Bates, A.W. (1995). *Technology, Open Learning and Distance Education*, Routledge, London.

Benfield, G. (2000). "Teaching and Learning on the web: Exploring the Meanings of Silence", http://ultibase.rmit.edu.au/Articles/online/benfield1.htm on 17.7.00

Benson, R. & Vincent, M. (1997). "Electronic delivery of study materials: the students' response", Conference proceedings 13th Biennial Forum of Open and Distance Learning Association of Australia, Tasmania, Australia, pp. 37-42.

Berge, Z. (1998). "Changing Roles of Teachers and Learners" ON-LINE Ed Bulletin 30/8/98 cited at http://www.edfac.unimelb.edu.au/online-ed/mailouts/1998/aug30.html on the 12/10/98

Biggs, J.B. and Telfer, R. (1987). "The Process of Learning", 2nd Ed., Sydney, Prentice Hall.

Boud, D.J., Bridge, W.A., & Willoughby, L. (1975). PSI Now – A review of progress and problems. *British Journal of Education Technology* 6:15-34.

Brown, A. (1997). "Designing for Learning: What are the essential features of an effective on-line course?", in *Australian Journal of Educational Technology*, 13(2), 115-126.

Brown, A. & Grigg, T. (1999). "Creating a Centre of Excellence in Flexible Teaching and Learning", HERDSA, Vol 20 No 3. Pp.6-7.

Brown, A. & Teague, M. (1998). "Use of distance learning in technology-based training: A pilot study in Hong Kong", Paper presented at *3rd International Open Learning Conference*, Brisbane, Australia, 2-4 December.

Brown, J, Collins, A., and Duguid, P (1989). 'Situated cognition and the culture of learning', *Education Researcher*, 18, 32-42..

Carlopio, J.R. (1998). *Implementation: Making place innovation and technical change happen"*, McGraw-Hill Company, Australia.

Clark, R. (1994). 'Reconsidering research on learning from media' http://www.educom.edu/program/nlii/articles/clark.htm, National Infrastructure Initiative, 9 pages.

Cunningham, S., Tapsall, S., Ryan, Y., Stedman, L., Badgon, K. and Flew, T. (1997). *New media and borderless education: a review of the convergence between global media networks and higher education.* Evaluations and investigations Program. Higher Education Division, Department of employment, Education, Training and Youth Affairs. AGPS: Canberra. http://www.detya.gov.au/highered/eippubs/eip97-22/eip9722.pdf

Daunt, C., (1997). "Is Teaching Different?" in the proceedings of Open Flexible and Distance Learning: Education and Training in the 21st Century, 13th Biennial Forum of Open and Distance Learning Association of Australia, Launceston.

Enterprising Nation: Renewing Australia's Managers to Meet the Challenges of the Asia-Pacific Century, (1995). Report of the Industry Task Force on Leadership and Management Skills, Commonwealth of Australia, (Karpin Report).

Evans, A. & Deschepper, A. (1998). "Inter university videoconferencing: Opening the doors to increased learner opportunities", Paper presented at *3rd International Open Learning Conference*, Brisbane, Australia, 2-4 December, pp107-111.

Fenwick, J.E. (1985). *Individualised Learning* Paper presented at the 13th ICDE conference, Melbourne.

Jonassen, D.H. (1985). Learning strategies: *A New Educational Technology.* 22:26-33.

Kay, D. (1997). "Flexible delivery: The white knight of training", in the proceedings of Open Flexible and Distance Learning: Education and Training in the 21st Century, 13th Biennial Forum of Open and Distance Learning Association of Australia, Launceston.

Lander, D. (1999). *Online Learning: ways to make task more interactive"*. UltiBASE(May).

Laurillard, D. (1993). *Rethinking University Teaching: A Framework for the Effective Use of Educational Technology.* London: Routledge.

Laurillard, D. (1995). *Multimedia and the changing experience of the learner*, British Journal of Educational Technology, Vol 26, No 3, 179-189.

Lemke, J.L. (1997) in Reinking, D. et al. (eds.) *Literacy for the 21st Century: Technological Transformation in a Post-typographic World*, Erlbaum, pp 1-17.

Light, P. (1993), "Collaborative learning with Computers", in P. Scrimshaw (ed.) *Language, Classrooms and Computers*, London: Routledge.

Luck, J., Andrews, T., Jewell, R., Schlotzer, A. & Madsen, M. (1998). "Teaching Skills at a Distance: A Method to the Mode (Or the Mode less Travelled)", Conference proceedings at *3rd International Open Learning Conference*, Brisbane, Australia, 2-4 December, pp233-239.

Lundin, R. (1997). "Flexible delivery of continuing professional education: Models, issues and trends (g)", Conference proceedings 13th Biennial Forum of Open and Distance Learning Association of Australia, Tasmania, Australia, pp. 269-276.

McCann, D. et al (1998). "Educational Technology in Higher Education", Canberra, DEETYA, (http://www.deetya.gov.au/divisions/hed/highered/occpaper.htm).

Mouritsen, J. (2000). *"Intellectual Capital and Knowledge Management"*. Paper presented at AAANZ 2000 Annual Conference, Hamilton Island, Queensland, 2-4 July.

Nikolova, I. & Collis, B. (1998), "Flexible learning and design of Instruction" in British Journal of Educational Technology, 29(1), 59-72.

Owston, R.D. (1997). "The World Wide Web: A technology to enhance teaching and learning?" *Educational Researcher*, March 1997, pp27-33.

Phillips, R (1998). *"Models of learning appropriate to educational applications of information technology"*. In B. Black & N. Stanley (Eds.), *Teaching and Learning in Changing Times (pp.264-268). University of Western Australia, Perth: UWA.*

Schubert, W.H. (1986). *Curriculum:: Perspective, Paradigm and Possibility*, Macmillan, New York.

Trigwell, K. (1998). "Increasing Faculty Understanding of Teaching" in Wright, A. (Ed.) *Teaching Improvement Practices.* Anker Publishing Company: Bolton, MA.

Wilson, B.G. (1996) Introduction: What is a constructivist learning environment? **In:** Wilson, B.G. (Ed), *Constructivist Learning Environments:Case studies im instructional design*, Educational Technology Publications, Englewood Cliffs, New Jersey.

Webfolios: Authentically Assessing Prospective Educational Leaders on the Web

Lori Kim, Ph.D.
Division of Administration and Counseling
California State University, Los Angeles
United States of America
lkim@calstatela.edu

Abstract: Technology was incorporated in portfolio assessment to create webfolios, portfolios on the World Wide Web. The webfolios project was implemented in the very first preparation class for the prospective educational leaders. The article first briefly describes the webfolio project, followed by the presentation of the results of the project evaluation, in terms of its strengths and weaknesses. The article also reports the result of the collaboration aspect of the webfolios through feedback. The article ends with conclusion and recommendations.

Introduction

There is a growing concern expressed in a broader meaning of accountability to include assessment of student learning outcomes. Educators are directed to choose and apply assessment practices that inform their instruction and communicate to multiple audiences (National Association of State Boards of Education 1988). Portfolio assessment is recognized as an authentic assessment that evaluates the student in the process of performing real tasks with relevance to his or her education (McAfee & Leong 1994). A portfolio is an organized, goal-driven documentation of professional growth and achieved competence over a period of time (Campbell et al. 1997). Students are responsible to take a more active role in their own learning as they make decisions on what to include in their own portfolios as evidence for their learning, using multiple methods from multiple sources over time (Shaklee et al. 1997). In order to provide such a learning experience for all students, teachers need to facilitate practices of active learning, such as collaborative learning, problem solving, and the use of interactive technology (Cornerstones 1997).

An innovative instructional strategy of student assessment was piloted at California State University, Los Angeles in the very first class for the prospective educational leaders in the Administrative Services Credential Program. Technology was incorporated in portfolio assessment to create webfolios, portfolios on the World Wide Web. The webfolios not only provide access to students and faculty the most current resources available through the World Wide Web, but also empower them to be active partners in the learning and teaching process. Because the progress of webfolios construction can be observed on the Web, on-going feedback exchanges among peers, faculty, and other browsers become possible. This capability of presenting student learning over time or the progress of student accomplishment to the public, webfolios become a valuable assessment tool to demonstrate our accountability to the public.

The article first describes the webfolios project briefly, followed by the presentation of the results of the project evaluation. The article ends with conclusion and recommendations.

The Webfolios Project

The Webfolios Project was implemented in an induction course for prospective school administrators, with a goal of creating student portfolios on the World Wide Web, thus demonstrating course knowledge and technology skills. Students were to prepare their individual induction plans in webfolios, including at least four elements--Vision Statement, Vitae, Academic Plan, and Professional Growth Plan. Students received training on developing webpages: Creating a home page, Linking files, Inserting graphics, and Formatting. The course was taught in a computer lab with a network access where students could obtain resources available through internet. As webfolios were being created and revised by the students, they were uploaded in a curriculum website housed in the university's website. The final product of student webfolios can be accessed from the Cal State LA's curriculum website at http://curriculum.calstatela.edu/courses/edad500.

Strengths

The results indicated that webfolios had many strengths in addition to those of traditional portfolios. As in the case of portfolio assessment, students commented that their webfolios showed continuous growth and helped them organize. The effectiveness of the webfolio would be meaningful only when it accomplishes the goals of the course, which is for students to create own induction plans in portfolios. The instructor wanted to ensure that additional feature of integrating technology would not impede students from developing their induction plans in the portfolios. The result indicated that students accomplished the goal without being too concerned about the means, technology format, as evidenced by following comments. "The process of developing the webfolios is very hands-on, and brings us face to face with our preparation or lack thereof." "I could easily view where I am now and where I will be later." "I got to see a reflection of my strengths and weaknesses." "The webfolio was representative of who I am."

Accountability was one of the most frequently mentioned strengths of the webfolios. Many students commented how the webfolios demonstrated their knowledge of current technology, such as learning about many resources available through internet, communicating through email, and creating web pages. Students were also quite pleased about the opportunities to present their portfolios as well as their knowledge of technology to a wider audience. A student expressed the excitement of realizing this benefit of the webfolios in her comment, "It has become an up-to-date means of presenting oneself. The webfolio provides innovative ways for one to present and evaluate candidates."

Almost every student mentioned about the accessibility of the Web as a strength of the webfolio. Students considered webfolios as "opportunities to 'show your stuff' all over the world." The majority of the students were quite conscious of the opportunity for their prospective employers to access their webfolios. Students thought webfolios demonstrated current technology skills, organizational skills, and administrative knowledge in an impressive visual presentation. Two students' comments represent overall feelings of the students. "Webfolios communicate innovation to prospective employers and more employers have access to your information without you having to mail out packages." "It's free. What better way to promote yourself career wise!"

Unlike traditional portfolios where students often agonize in the process of developing portfolios but find satisfaction of accomplishment in the end, the process of creating webfolios was entertaining. More than 90% of the students commented how fun and convenient the process was. Students found the activity fun and interesting because they found it challenging yet were able to master each step and accomplish beyond their expectation on their own. Initially, students only expected have a simple document in each section of their webfolios as required in the class. However, each time they accomplished something on their webfolios, such as inserting a graphic or changing fonts, their webfolios looked nicer, more impressive, and more visually appealing. It was this enjoyable aspect of the activity that also contributed to upgrading the technology skills of the students. More than 95% of the students responded that their technology skills were increased. Many of them indicated that they no longer had the fear about technology and became very confident and willing to explore more on technology.

The students also noted how convenient it was to have all of their information on one computer disk. One student commented, "the webfolio provides room to add growth of portfolio without having to carry a lot with you." In addition, students also noted how easy it was to update information, revise the content, or reorganize the materials in the webfolios. A student added his sales pitch for the webfolios, "it organizes your documents for you."

Another strength of the webfolios deserves serious consideration as educators reflect on the authentic assessment of student learning. As Duncan (1996) points out, authentic assessment is based on meaningful performances that are drawn from "real-world" contexts. When students are helping each other to perform better without being concerned about the competition of their grades in class, authentic assessment of student performance is actualized. This collaboration was often mentioned by the students as a strength of the webfolios. Students not only helped each other with technology problems, but they also enthusiastically exchanged newly acquired knowledge about resources available through internet, such as graphics and valuable websites. Throughout the quarter, they supported each other with comments of encouragement, suggestions for improvement, and commendations for good work. Many students commented about how valuable sharing information and feedback comments were.

Weaknesses

There were some barriers to overcome for webfolios to be implemented in university classrooms in general. The first weakness of the webfolios was that students must have an access to a computer with internet. Some students had no access to a computer or the Netscape Editor outside the classroom and found it difficult to spend extra time on their webfolios away from school.

Another weakness of the webfolios was the extra time and effort required to train students on technology skills of creating webpages. The process of creating webpages was especially time and energy consuming for those students with limited technology skills. Some of the students commented that they could not have finished their webfolios without extra assistance provided by the instructor and the technology assistant.

The next weakness is a side effect of the access strength of the webfolios. Because webfolios are accessible to anybody who visits the website, students had to be careful about private information. Students were advised to delete private information, such as home phone numbers, address, information about their references, and other private information that they did not want to publicize so widely. Many of them included their email addresses in place of phone numbers and addresses. "References available upon request" replaced the list of references. One student expressed concerns about possible plagiarism since she was linking the courses in the academic plan web page to some of her well-written papers for the classes.

One of the greatest barriers to overcome for the full implementation of webfolios may be the university policy regarding the authority access to the websites. The university provided a space in the university curriculum website to build the course website. However, according to the university policy, only the instructor was authorized to update or make changes in that particular website. This policy created frustration both for the instructor, who had a burden of uploading 22 students' work each time any change was made, and for the students who had to wait to see the changes on the Web until they were uploaded by the busy instructor.

Feedback

As mentioned earlier, collaboration among students in the process of developing webfolios was evident as they shared their resources and internet information beyond the course required exchange of feedback. More than 90% of the students responded positively about the feedback comments received. The other 10% of the students who expressed negatively about the feedback received comments either too sparingly or untimely.

The feedback seemed to have served the purpose of providing another set of eyes for different perspectives. As mentioned by one student, " the comments were mostly good ideas which came from a 'fresh' viewpoint." Students also mentioned that the comments were frank, helpful, appreciated, and "caught some of the errors." Based on the comments received, students were able to reflect upon their own work and consider implementing the changes suggested. Students wanted more than brief comments, such as "nice job" or "great work." They appreciated the comments that indicated why the webfolios were "nice" or "great."

Students especially enjoyed the exchange of comments because of the non-judgmental nature of the activity. Unlike the comments received by the instructor, students were able to easily disregard the comments that they did not agree with. As one student commented, "yes, the feedback comments made me think about the changes... but the decision was left up to me. They were given to me as suggestions, but I had to decide whether the change was to be made or not."

Suggestions

Advice provided by the students for those who would be doing webfolios in the future was classified into four categories: (a) Personal Encouragement ; (b) Getting Help; (c) Organization; and (d) Webdesign. The first category resulted from the fact that it was the very first attempt to create webpages for most of the students. Their advice was to pay attention to the directions, be patient, and take time to be accurate. As one student commented, "Take a deep breath. It isn't as scary as you think. Pay attention the first time carefully and you'll be amazed at how easy it is at house."

While the second category about "getting help" still had to do with their being novices in creating webpages, it seemed to have evolved from their collaborative experiences with peers. Frequently mentioned advice was to work with a partner, talk with other students about input and ideas, and "view other people's web pages to get some ideas to make improvements on yours." The target source of getting help was expanded beyond the technician and the instructor to include peers, in general, as well as unknown webdesginers whose web pages were available on the Web.

The third category on "organization" covered two facets of webfolios, i.e., issues dealing with portfolios and technology aspect of the webfolios. Advice such as keeping files in order, planning ahead, and starting early applies to both traditional portfolios and webfolios. Other suggestions, however, covered specific issues dealing with creating webpages of the webfolios. Students suggested not only to "keep all of your files together and under one program so the linking process will be easier" but also to "become familiar with the names of your files or addresses that you use on a regular basis." As in the case with all other computer files, students also emphasized the importance of saving everything on multiple disks.

Finally the last suggestion demonstrated the knowledge acquired by the students from developing their own webfolios. Students remembered to point out the lack of spell-checker in the Netscape Editor. "Proofread constantly." In addition to the advice on technical issues like "link information from one source to another to give additional information," there were many professionally sound recommendations such as "be very creative, create an eye catcher, but be brief" or "add something that gives your homepage individuality and ties in to a little story/tidbit about you personally." Some students not only demonstrated competence as webdesigners but also the improved skills in providing feedback. "Add graphics sparingly because too many graphics will detract from the most important content of your webfolios, YOU."

Conclusion and Recommendations

The California State University has recently established policy goals, including university accountability in its Cornerstones Project to ensure provision of educational excellence in a teaching-centered, collegiate institution and to demonstrate effectiveness to the public (Cornerstones 1997). The focus of the Webfolios Project, or student portfolios on the World Wide Web, centers around this important issue of accountability through appropriate assessment of student learning outcomes and communication of assessment to multiple audiences.

The evaluation study of the webfolios seems to indicate that webfolios may be used as means to demonstrate accountability to multiple audiences. As in the case of traditional portfolios, students can assess the growth of their learning over time and demonstrate their accomplishments in their webfolios. In addition to increased technology skills, students praised about easy accessibility and convenience of portfolios on the Web as they found unique opportunities for collaboration as they shared information, resources, and on-going support throughout the course. Building one other to grow in knowledge and skills instead of competing against one another during the process of assessment helped students make assessment truly a part of learning. Webfolios may indeed become an authentic means of student learning outcomes.

From the results of the study, it is recommended that university policies be revisited regarding possible plagiarism through easy access in the World Wide Web and authorizing students access to upload their own webpages on the Web.

The completed student webfolios discussed in this article can be viewed from the Cal State LA's curriculum website at http://curriculum.calstatela.edu/courses/edad500.

References

Campbell, D., Cignetti, P., Melenyzer, B., Nettles, D., & Wyman, Jr., R. (1997). *How to develop a professional portfolio: A manual for teachers.* Boston: Allyn and Bacon.

Cornerstones. (1997). http://www.calstate.edu/cornerstones/reports/newreport.html.

Duncan, P.K. (1996). How can we prepare reflective administrators for a non-reflective world? "Alternative" assessment can help. *The Journal of CAPEA, 8, p.43-58.*

McAfee, O., & Leong, D. (1994). *Assessing and guiding young children's development and learning.* Boston: Allyn and Bacon.

National Association of the State Boards of Education. (1988). *Right from the start: The report of the NASBE Task force on Early Childhood Education.* Alexandria, VA: NASBE.

Shaklee, B., Barbour, N., Ambrose, R., & Hansford, S. (1997). *Designing and using portfolios.* Boston: Allyn and Bacon.

Three Roads Diverged and We Took All Three

Dr. Hilarie B. Davis
Project StoryTeller
Technology for Learning Consortium
United States
hilarie@techforlearning.org

Dr. Belinda G. Engelhart
Vice President of Academic Programs
DIAL Corporation
United States
belindaengelhart@home.com

Dr. Karen Korth
Director Professional Development
DIAL Corporation
United States
kkorth@bloomnet.com

Abstract: The panel members will discuss and demonstrate through interactive videos and cd-rom some of the experiences along the journey implementing the technology integration projects (TIPs) and utilizing educational integration approaches in both the LITE (Linking Interactive Technologies and Educators) Institute and the WebMaster Institutes to achieve the desired outcomes of the ILC (Interactive Learning Campus). The three roads taken by DIAL to enhance teacher use of technology are: Technology Integration Projects (TIPs), LITE Institute and the WebMaster Institute program. The WebMaster program is a skill-based program while the TIPs projects and the Master Teacher Cadre meet on demand needs for curriculum and professional development and the LITE Institute encompasses the entire program for longevity and sustainability of technology use in the schools and communities.

Components of the Interactive Learning Campus (ILC)

Introduction

Learning on demand. Teaching has been called the noblest profession, the loneliest and the most critical for the future of our democracy. With the importance and challenges of the profession, how do we support these teachers? How do we help them to grow? One of the approaches the Interactive Learning Campus has taken is to offer professional development "on-demand" as teachers respond to the challenging task of creating student centered technology assisted curriculum. Teachers working with design teams of students, parents and partners are pushed by the requirements of the task, the diversity of opinions and the potential of technology.

How do teachers meet this challenge? They learn by doing. A web-based structure provides a framework for co-development and student use, and a rapid prototyping process supports the action/reflection cycle that is at the core of learning. Regular opportunities for reflection are provided through storytelling meetings, in which the teams think out loud with about their vision, ideas and questions.

Inquiry is based on the learners' questions, as they work toward a goal. Team members discuss, reflect, test out and refine their ideas. The IBL (Inquiry-based-learning) Website and the rapid-prototyping process support inquiry through the co-development of ideas by the design teams. This models the processes students will use in taking the courses.

As the design teams figure out how the content and the technology come together into course modules that will provoke student inquiry, they are asking the questions that drive their own professional development:

What is your vision of this course? How will students be different? *Vision map*;
What are the key ideas on this topic? *Goals map*;
What is interesting to students about these topics? *Scenarios*;
What are the knowledge bases that will support students' inquiry? *Knowledge Bases*;
How do students learn through these modules? *Digital Portfolios;*
How will these courses fit into the curriculum? *Concepts Skills and Curriculum alignment;*
What is the role of teacher in the use of these courses? *Teaching with Inquiry-based-learning.*

The Interactive Learning Campus is based on an action/reflection culture. Since part of **culture** is the stories we tell ourselves, we have built storytelling into the process of building our learning communities. These stories are the oral history of our understanding. They are dynamic and evolving. The stories help us understand each other in our understanding. Storytelling activities include: meet and make the thinking visible of the group; provide an ongoing record of the group's thinking; support individual story telling of teachers doing curriculum design; provide a context for developing waves of innovators; tell the stories of development to those implementing the courses.

Technology Integration Projects (TIPs): The Curriculum Road

Technology Integration Projects (TIPs) are the principal vehicle by which DIAL will implement broadly based systemic changes that will constructively alter the landscape of rural K-12 education. The intent of the Consortium is to create a new learning environment through its *Interactive Learning Campus* - increasing access to high-quality information and improving teaching and learning through engaged learning practices. There are ten essential areas of emphasis complementing DIAL's commitment to distance education and engaged learning. These will be implemented on a phased basis: Curriculum Development, Technology Integration, Project Management, Telecollaborative Development, Interdisciplinary Courses, Just-in-Time Professional Development, Preferred Learning Styles, Automated Assessments, and On-Demand Information Access.

The TIPs participants within DIAL schools have access to a variety of support systems during the entire curriculum development and technology integration process. In addition to the local students, parents, partners, and community resources available to the teachers, the DIAL professional staff will work closely with the teams. Currently five (5) first round of projects (Pathfinders) are nearing completion and a second round of six (6) projects (Trailblazers) is beginning development.

The Master Teacher Cadre: The Professional Development Road

The major focus of the Master Teacher Program is to build the human capacity throughout the consortium to fulfill the defined outcomes of the Interactive Learning Campus: ***1) increased access, 2) improved teaching and learning, and 3) enhanced community development.*** The Master Teacher Program will enhance human capacity of educators by: developing skills and processes that encompass engaged learning theory, creating comfort and models for distance education technologies, and identifying and practicing effective leadership and communication processes.

The Master Teacher Program is designed to use distance technology as a viable alternative to all levels of formal schooling: primary, intermediate, secondary, and post secondary. The program models this with the delivery of the graduate courses offered via a variety of distance technologies. The program centers around using engaged learning practices and an integrated educational approach working with three partnering universities to deliver the graduate programs. The partnering universities are The University of Nebraska –Lincoln, The University South Dakota, Vermillion and Dakota State University in Madison, South Dakota. The program utilizes learning theory that encompasses engaged learning and is related to the constructivist approach to andragogy. Practices that support engaged learning theory implement: understanding multiple intelligences and how the brain works, team building and teaming practices, a board sense and vision for student assessment. Skills, models and technologies practiced within the masters program serve as a model to schools throughout the consortium and the state of South Dakota.

The Master Teacher Program will provide training, practice and theory for the participants. The outcome of the programs will create and promote effective leadership and communication in their schools and throughout the state. Leadership theory and skills that embrace the concepts of team and collaborative efforts are essential to success of the outcomes of the Interactive Learning Campus. The goal is to enable small shifts and transitions in current education perspectives to happen. This will in turn lead to some very forward thinking teachers and principals who are able to create some areas for experimentation and flexibility.

The WebMaster Institute: The Digital Road

The WebMaster Institute program utilizes an integrated educational approach incorporating the New Jersey Institute of Technology and the University of South Dakota. The NJIT WebMaster 2001 Program is designed to accommodate the flexible needs of teachers and students who participate in its academically rich, distance learning courses. The program is designed to be self-placed and self-paced, consisting of three 30-hour training modules: Web Author, Web Graphics - Photoshop, and Web Graphics - Flash. Both teachers and students will complete the program via distance. The selected teams will be registered in the courses, be given unique account names and passwords to enter the courses. NJIT uses WebCT as the courseware tool for the online delivery of their courses. All participants receive the WebMaster 2001: WebMaster Fundamentals Certificate from NJIT. The University of South Dakota is granting graduate credit for the coursework completed by the teachers with an additional course on integration of the web-based skills. In addition the University of South Dakota is granting dual credit to the student team members. Each of the students receives one high school credit along with six college credit hours, which transfer in as two- three credit hour courses.

The goal of The WebMaster Institute is to have five teams of teachers and students, from each of the Consortium's thirty-three school, receive certification. This will result in 165 teachers and 165 students being available for joint internships within their schools and communities, as well as for the delivery of web-based courses through The LITE Institute.

1. It is possible for parents, school technologists and partners to also take the courses simultaneously with teachers and students. They will receive certification training through DIAL as well.
2. The WebMeister program is targeted for the student members of the team, resulting in dual credits for 10th, 11th and 12th graders.
3. The WebMeister-Junior program will reach down and enable 5th through 9th grade students to participate fully with their teachers in WebMaster Institute curricula.
4. Every team will have the opportunity to apply their knowledge in community-based internship during or upon completion of the coursework.

The LITE Institute (Linking Interactive Technologies and Educators): The Interstate System

The principal dissemination vehicle for the delivery of these curriculum units is The LITE Institute, which focuses its services on: (1) capacity-building of K-12 educators, administrators, technologists, and librarians using traditional, distance, and just-in-time formats; (2) skills-building through curriculum development and technology integration courses and consultations, emphasizing high-quality course content, distance education, instructional design, and engaged learning best practices; and (3) evolving and emerging automated assessment technologies, tools and techniques, using such advancements as neural networks. Quite often, these are viewed a worlds within themselves. DIAL's goal is to merge these into everyday best practices within the Interactive Learning Campus.

The LITE Institute is a statewide technology-based resource. The overall strategy of the Institute requires seamless integration of four areas of contribution:

1. professional and staff development initiatives,
2. curriculum development and technology integration services,
3. comprehensive, cross-disciplinary distance learning courses, and learning assessments.

Summary

The three roads diverge in terms of the route they take. But unlike Frost's roads, our roads all end up uniting in the Interactive Learning Campus. Each initiative builds skills and contributes to the development and sustainability of the campus. As webmaster teams build technical skills, TIPs teams build Inquiry Based Learning Modules and the LITE Institute offers connections with a larger community, we see the campus grow and build new byways and highways to create interdependence in our learning community.

Software Agents for Distance Education and Institutional Support

Thresa Lang
Veridian Information Solutions
United States
tblang@cox.rr.com

Abstract: In this paper the author explores the use of software agent technology to provide options and solutions for the challenges facing educational institutions that have limited or fixed resources. One of the challenges examined is that of providing quality instruction to increasing numbers of students, including those with non-traditional scheduling requirements without straining current resources. Other challenges include optimizing the existing network infrastructure and supporting institutional business goals

Introduction

Educational institutions have three major sets of overarching goals, those relating to the quality of instruction, those relating to the quality of the supporting organizational infrastructure and those general business oriented goals that affect all of the others. Concerns and challenges within these sets of goals can be successfully addressed by the application of agent technology.

Software agents are network-enabled applications that are being called "the next great wave of innovation and development across the Infosphere comprised of the Internet, Intranets, Extranets, World Wide Web, and countless other networked computer systems…This technology is expected to eventually have an effect as profound as the World Wide Web" (1997). If properly developed and fully utilized, this technology could prove to be not just a solution for existing problems or a method for achieving institutional goals, but a resource that could strengthen the institution's competitive position.

Pedagogical Agents

The instructional goals include the development of methods that retain or improve the effectiveness of instruction. This includes addressing all learning styles and personalizing instruction according to individual needs, while accommodating students who are geographically dispersed and increasingly require non-standard scheduling (Latchman, Salzmann, Gillet, & Bouzekri, 1999).

These goals can be addressed through the thoughtful application of pedagogical agents. A pedagogical agent is an agent that acts as a guide or instructor for education and training purposes. The primary function is to support humans in accordance with the application of pedagogical theory within learning environments. They will act upon the environment and interact with the user in ways that will facilitate learning, while dynamically responding to spontaneously occurring opportunities for instruction and personalized tutoring. This is possible because the agent monitors the progress and current knowledge of the student in each task. The agent has knowledge of the skills that are needed for the task, as a human expert would demonstrate them. It then compares this knowledge with the student's performance of the same skill.

Pedagogical Agents can be built with fuzzy logic and neural network components that will allow them to recognize the learning pattern of the student and from that pattern, predict what the student's response will be. This allows the agent to prepare personalized corrective strategies and materials regardless of the number of students being taught. The agent can independently choose to apply these strategies before the student realizes that there is a knowledge deficit in a given area. Such a system will track changes in the student's responses and bring them in line with the expert's responses as they are coded into the agent's knowledge base. A well-trained neural module would also allow the agent to differentiate between actual learning problems and errors made from carelessness or fatigue (Lively, 1992).

Agents can also be used in realistic simulations that provide multimodal instruction for both distance and traditional education environments (Lester, Rickel, & Johnson, 1999). These simulations can be used at anytime, by single students or with groups. Faculty staffing issues can be further addressed by using the agent capabilities that allow them to teach autonomously (Johnson, 1997). This allows the ratio of students to instructors to increase without affecting the quality of the instruction. This quality of instruction is enhanced through the use of personalized tutoring capabilities available with some agent applications (Rickel & Johnson, 1997).

For example, Adele is an animated pedagogical agent developed at USC's Information Sciences Institute's Center for Advanced Research in Technology for Education (CARTE) (Johnson, 1997). She is used for medical education in the areas of family medicine and graduate level geriatric dentistry. She was designed to run on conventional desktop workstations with conventional interfaces. In order to expand the agent's effectiveness, she runs in a student's Web browser. In this way she integrates Web-based resources with other learning materials and serves a guide through the lesson.

When operating in Advisor mode, Adele will interrupt any student action that is not in accordance with standard practice. She then suggests a different approach or action, or refers the student to a resource, such as a video demonstration, audio clip, or Web-based reference material. Regardless of the mode in which she is operating, Adele makes full use of opportunistic instruction by providing hints or references in all appropriate situations. She will also provide immediate responses when students ask "why" questions. In this way instruction is simultaneous with problem solving, and the student can immediately use the information.

Adele employs a hierarchical representation where the preconditions and effects of each step are explicit. This structure also includes sets of possible actions a student might take at different points in the program. She explains process steps in terms of motivating facts about the domain. For example, her response to a question about why an X-ray should be ordered would include reasons why X-rays are important in this type of case.

Adele's persona includes several behaviors as well as the ability to have new behaviors added. Actions and communications are generated using a behavior state approach. This consists of a library of searchable behavior fragments including visual segments showing her repertoire of movements, audio clips accompanied by a commercial speech synthesizer to serve as utterances, and occasionally segments of other background sounds, such as music. A behavior-sequencing engine dynamically joins selected fragments at run time. The result is that Adele displays seamless behavior and appearance to the student.

Projecting Adele's seamless behavior is a technical challenge due to the latency associated with Web-based applications. The solution places the agent's reactive behavior on the client machine. A solution for this is to move the student-monitoring part of the application to the client machine. Although this places more processing on the client, it is still at a level where any platform with a reasonable amount of memory and processor speed can successfully execute the program.

Learning Environments

Current advances in the technology for both agents and virtual environments have combined to provide many options for implementation within the learning environment. One such option is a simple, easily constructed, text-based Multi-User Dimension (MUD). These environments are substantive, provide opportunities for rich educational interactions and are scalable so that many learners can participate simultaneously (Kiss, 1997).

Since many mobile agents are designed to travel between MUDs in order to allow users to communicate in real-time, they must be capable of functioning in unfamiliar environments. In order to do this they must either have advanced reasoning capabilities or they must be able to get information from the environment itself. Agents can access some information by making queries, but frequently, this environmental data does not include definitions of its own semantics, and cannot be understood by all agents. One approach to facilitate interaction within unfamiliar environments for users and agents is that of creating annotated MUDs.

Whether human or agent, the inhabitants of well-designed spaces can find implicit clues concerning the purpose and operations of objects within their environment. This type of clue provides agents with an understanding of the meaning and context of the MUD. In this way an agent can directly query the environment in order to determine appropriate behavior within that space, available activities, and recommendations for exploiting the environment in accordance with its goals and abilities. Since it is not necessary to learn the space, the agent only has to interpret it. Annotations also ensure that the agent always has current information and is able to immediately make use of the knowledge, which results in a more rapid response.

In this approach, the environment can be modified in any way, and the agent responses will automatically change according to the annotations provided. At this time there are five types of annotations that can be integrated into MUDs and other environments (Doyle & Hayes-Roth, 1998).

- Emotional annotations provide information about either events or environments, and explain acceptable responses.
- Responsive annotations provide either domain specific actions or suggest the use of behaviors built into the agent in order to explain appropriate behaviors.
- Problem-solving annotations describe puzzles included in the MUD; provide hints about them that the agent might give the user through speech or action. When the puzzle has been solved, the annotations will update the agent with the current information.
- Role annotations inform the agent about actions or events that are relevant to its performance of specific functions within the environment. In this way the agent can combine its personality with domain-specific behaviors so that the user perceives and integrated, believable character.
- Game playing annotations describe the status of a game or any bounded multi-user interaction, and inform the agent of its performance within it. They will also suggest moves to the agent that are based on its skill level, personality and motivations. This category is dynamic and requires that the environment compute real time responses.

These annotations help to support a dynamic, constructivist environment to enhance student learning.

Infrastructure Support

Institutional support goals include such items as the optimization of existing classroom technology and network infrastructure. Both wide and local area networks can be optimized without additional staffing or extra hardware investments by employing network management agent applications (1999c). These applications can also automate daily tasks such as network and database backups, batch processing, mail sorting and scheduling (1999b). Network agents are also used to map dynamic networks, routing paths, and for allocation of distributed resources. Application, data and transaction security, as well as user access can be monitored and enforced according to the rules activated in agent applications.

Equally as important for educational institutions, is the ability of highly efficient agent search applications to reduce the network load associated with the traditional search and retrieval methods used for on-line research (Knapik & Johnson, 1998). The benefits of neural network enhanced information retrieval agents are even more evident when the technology is applied to Web-based searching. This hybrid virtually eliminates the massive bottlenecks and information latency that accompany current search tools. This is especially true of those meta-search tools that distribute the information retrieval between many services. This is because traditional search tools broadcast user queries to several information sources simultaneously. The results are then merged and all are made available to the user. Often the desired information is located by only one tool, and the others utilize the network in order to return irrelevant data, which must then be manually sorted by the user

Frequent users of these services know that the complexities of tagging and searching the information result in different findings being produced by different engines. Since the search engines cannot differentiate data patterns and characteristics, they frequently return non-applicable data. Agents with neural network modules can cut through the useless information using advanced pattern recognition capabilities, can discover and map information in its current location. In this way, dynamic information can be cataloged; and mis-catalogued, or poorly tagged information can still be identified regardless of what the original structure of the data was.

The search agent known as WebCrawler uses a collaborative approach. It reduces search time by posting all queries at a central location, and allowing other agents to access them. The agents then collaborate on those for which they have high priorities or qualifications. This collaboration can take the form of exchanging information or breaking the query into small segments, each of which is then executed by different agents (Knapik & Johnson, 1998).

Another approach to information filtering and retrieval by an assistant is found in BUZZwatch. This is an agent program that traces trends, themes and various subjects across real-time applications and archived information. It is an expert in data mining and text analysis that can facilitate research by combining time and series analysis. In this way it can help a user track the development of a subject through chat rooms, newspaper archives and on-line texts (1999b).

The Expert Finder finds information by tracing experts in any field requested by the user. In this way people can benefit from the knowledge of individuals of which they might not otherwise have been aware. This allows communities to leverage the combined knowledge of all members and allows the user to find an expert who can help with any problem.

An organization can also choose to mange its data with agent applications. This is becoming more attractive and necessary as traditional databases give way to huge and complex data warehouses and 3 dimensional repositories. In this environment, agents are critical for preventing data corruption and retrieval problems. This is accomplished through enforcing data constrains that reject out-of-range data, systemic deletions, duplications and other illegal operations.

Agents responsible for data integrity verify memory, I/O ports, actuators and other items during otherwise wasted CPU cycles. Some run in the background, testing referential integrity of data values. When problems are found, the agents can either issue reports about them or fix the error, depending on their specific parameters.

Many organizations are discovering that agents can perform backups of distributed databases without the databases being taken off line. The agent freezes tuples of data, records changes in a file, then executes incremental backups by merging the changes into the database. The Lotus Notes backup agent also fulfills the function of notifying the Database Administrator concerning issues such as available server space.

Business Support

The general goals of educational institutions parallel those of any business, and focus on functioning within constrains imposed by budget, staffing, facilities and other fixed resources. Methods to increase the personal productivity of staff and faculty would also be included within this set of goals (1999a). This might be addressed by the use of reliable automation for repetitive office and organizational support tasks. Another way agent technology helps support staff productivity is through the use of Personal Digital Assistants (PDAs).

Agent technology is growing at a remarkable rate in the area of personal digital assistants. These agents help in the business environment where they maintain user appointments, plan work processes, and collaborate with the user to perform complex tasks. They are also used extensively for mail management and in information retrieval situations where it is critical to sort through large amounts of data in order to find specific information. This is especially important in education where the amount of information available for research and teaching grows at an exponential rate.

Many of the agents designed for information retrieval and filtering are enhanced with neural network modules. These represent a hybrid form of retrieval agent with capabilities unrivaled by any other current approach. They enable the learner to access the precise information needed because they can be trained to search for specific items that match the users desires and preferences. The agent is optimized as the user provides data about the relevance of specific findings and then compares it to what they are actually looking for. The associative mapping capabilities from the neural technology allow the agent to remember the location of material that displays the characteristics of the desired information. This allows agents to search in a manner well beyond the scope of technologies using page tags and keywords.

The increasing use of digital assistants from different platforms and with different standards has highlighted concerns about possible problems due to agent incompatibilities. Carnegie Mellon University has taken a proactive approach to the problem and is building agents that will facilitate the communications between incompatible types of agents. These are called matchmaker agents, and they are designed to translate using a new capability description language. This allows them to serve as intermediaries between agents requesting services and those providing them. Currently digital assistant research includes all aspects of daily management and information, such as personal calendar managers, financial portfolio mangers, and joint mission planning for large organizations (1999a).

Organizations that endorse the use of personal digital assistants not only help employees become more productive; they also gain an extra bonus in the area of network performance. This is because less bandwidth is required for these agents than is needed to use traditional databases that have vector space model information retrieval mechanisms. This translates into reduced communications costs for the institution and provides quality results to the user in less time. These advantages will become more apparent as the amount of accessible database information increases (Yoo, 1999).

Management must also ensure that the initial cost of any new technology support for the organization or for instructional methodology is offset by the benefits as determined in a cost of ownership, return on investment, or cost benefit analysis. Agent technology also provides solutions for these concerns (1999a). Because many agent applications run on common platforms or are cross-platform, using them does not require expenditures for major hardware upgrades. Although the overall costs are dependent on the specific technology and its implementation, the wide range of readily available applications addresses nearly every need and budget.

Conclusions

Overall, the advantages of agent technology for educational institutions cannot be overstated. This technology is able to positively address every major institutional goal while using a minimum of resources. Overall, the advantages of agent technology for educational institutions cannot be overstated. This technology is able to positively address every major institutional goal while using a minimum of resources.

The application of pedagogical agents is an area that should be explored by all schools and universities. If properly developed and fully utilized, this technology could prove to be not just a solution for existing problems, but a resource that could strengthen the institution's competitive position.

References

(1997). *The Agent Society*, [On-line]. The Agent Society Organization. Available: http://www.agent.org/frmain.htm [1999, 8/29/99].

(1999a, 8/1/99). *Intelligent software agents*, [On-line]. Carnegie Mellon University Robotics Institute. Available: http://www.cs.cmu.edu/~softagents/ [1999, 8/29].

(1999b). *MIT software agents group: Projects*, [On-line]. MIT Media Lab [1999, 8/29/99].

(1999c). *Products and Solutions*, [On-line]. Novell Corporation. Available: http://www.novell.com/products [1999, 12/1].

Doyle, P., & Hayes-Roth, B. (1998). Agents in annotated worlds. *ACM Autonomous Agents, 5*(1/98), 173-180.

Johnson, W. L. (1997). *Pedagogical agents*, [On-line]. Center for Advanced Research in Technology for Education. Available: http://www.isi.edu/isd/carte/ped_agents/pedagogical_agents.html [1999, 11/20].

Kiss, P. (1997). *Evaluation of MUDs and the role of intelligent agents.* Paper presented at the Combined Winter Conference on Educational Uses of MUDs, Jackson, WY.

Knapik, M., & Johnson, J. (1998). *Developing intelligent agents for distrubuted systems.* New York: McGraw-Hill.

Latchman, H. A., Salzmann, C., Gillet, D., & Bouzekri, H. (1999). Informaition technology enhanced learning in distance and conventional education. *IEEE Transactions on Education, 42*(4), 247-254.

Lester, J. C., Rickel, J. W., & Johnson, W. L. (1999). *Animated pedagogical agents: Face-to-face interaction in interactive learning environments*, [On-line]. Center for Advanced Reasearch in Technology for Education. Available: http://www.isi.edu/isd/VET/vet.html [1999, 11/20].

Lively, S. M. W. (1992). Using a neural network to predict student responses. *Proceedings of the ACM/SIGAPP symposium on Applied Computing, 2*, 669-676.

Rickel, J., & Johnson, W. L. (1997). *Integrating pedagogical capabilities in a virtual environment agent* . Marina del Rey: University of Southern California.

Yoo, Y. S. C. S. I. (1999). *Multi-agent learning approach to www information retrieval using neural network.* Paper presented at the IUI'99: proceedings of the 1999 international conference on intelligent user interfaces, Redondo Beach, CA.

System-wide Planning for Technology in Teacher Education: Lessons Learned at The University of Wisconsin System

Dana Nelson
Academic Affairs
University of Wisconsin System Administration
United States
dnelson@uwsa.edu

Abstract: This paper reports both the processes and outcomes of the University of Wisconsin System's effort to facilitate technology integration throughout its thirteen teacher preparation programs. The context and rationale for the effort, the change strategies employed, and the results of institutional and system planning are explained. The paper also reflects on lessons learned from the planning effort. The planning effort has been conducted within a context of organizational change characterized by facilitation, engagement, and decentralization.

Introduction: Context and Rationale

A former member of the University of Wisconsin Board of Regents noted that bringing about change in the university system was tantamount to "moving a battleship with your bare hands" (Weinstein 1993). The regent's frustration was with changing the direction of a large and complex system within a culture of faculty governance and the reluctance of institutions (and their curriculum) to change with the times and be more responsive to external stakeholders.

The topic of technology in teacher education can elicit similar frustration from policy makers and school district representatives. The state of Wisconsin is no different from other states in placing significant investments and emphasis on the technology proficiency of its students and teachers. The state is investing hundreds of millions of dollars in information technology hardware, software and infrastructure in K-12 schools. Furthermore, the state has estimated that approximately $20 million are expended annually in a combination of federal, state, and local funds in teacher professional development in technology (1999 TEACH Wisconsin).

In spite of these investments and expectations that they will promote greater student achievement, there is cause for concern. The National Center for Education Statistics reported that only twenty-three percent of both new and veteran teachers were "well prepared" to integrate educational technology into the curriculum (1999 NCES). And a state-wide assessment of the LoTI or Levels of Technology Integration survey (1999 Moersch) indicated that only seventeen percent of teachers surveyed in Wisconsin currently integrate technology into the curriculum (1999 TEACH Wisconsin).

The Change Process

To address concerns about technology preparation of new teachers and the continuing professional development of practicing teachers, the University of Wisconsin System initiated an effort to develop and promote best practices in technology throughout all of the institutions within the system. (The system is composed of fifteen institutions; thirteen of them have teacher preparation programs therefore those institutions were the focus of this effort.) This broad-based and inclusive planning effort was created to address concerns of external stakeholders as well as issues raised within System Administration about the extent to which the universities were integrating technology throughout the curriculum, including field experiences. System and institutional leaders had frequently been chided by legislators and other external constituents with anecdotal reports of how teachers were ill prepared to use technology in today's schools. In addition to the anecdotal reports, the surveys cited above were used to exert pressure on the system to address the issue of technology in teacher.

The framework for this effort was systemic; i.e., it was conducted at multiple levels of the organization. Both UW System Administration and individual institutions were expected to facilitate desired change. Wisconsin, like other states, has a consolidated system of higher education that was created to join state and teachers colleges with the land grant institution, as well as the urban institution. The state government merged the previous systems to provide better planning and coordination, curb growth, provide more effective and equitable distribution of state resources, avoid duplication and competition among institutions, and ultimately to better serve state citizens with improved access and planned resource allocation (Glenny, Berdahl, Paltridge 1971; Glenny 1977; Halstead 1974; Millard 1981). Moreover, technology is an area of academic planning in which coordinated planning and policy are frequently deemed necessary (Olcott 1996; Zeller 1995). In spite of these expectations, there is inherent tension between a central system administration and the individual campuses when trying to facilitate change; according to the literature, the very act of coordination can be viewed as a challenge (if not an attack) on institutional autonomy. If faculty perceive that decision-making--especially about fundamental curricular decisions such as technology integration into teacher education--are shifting from them to a central administration or bureaucracy, the hostility and tension will increase (Dearing 1972). More importantly, the goal of improved and more responsive programs would not be realized.

Given the role of System Administration and the need to manage tensions between the administration and institutions, the planning and change process was conducted at multiple levels with significant opportunities for discussion through facilitated iterative processes at individual campuses and system-wide. The initial impetus was top-down with the creation of a high-level task force that included representatives from state agencies, school districts and the universities. The Senior Vice President for Academic Affairs of the system, with the support and encouragement of the system president, created the task force. The task force was charged to (a) review standards from national and professional organizations for benchmarking purposes; (b) review state technology standards for PK-12 students; (c) collect information on current practices in UW programs to have data for assessment and decision making; and (d) work within the context of fundamental changes in teacher education program approval, licensure, and professional development. (See the Wisconsin Department of Public Instruction's Web site for information about reforms to teacher education: www.dpi.state.wi.us/dpi/dlsis/tel/restruct.html).

The Best Practices Task Force began data collection by surveying the institutions to obtain baseline information about current practices. Institutions reported on the following: (1) What courses and /or experiences are used to develop teachers' understanding of the uses of technology for the subjects they plan to teach? (2) What are the schools of education plans to assure that their faculty are (a) knowledgeable about current practices related to the use of computers and technology, and (b) able to integrate technology into their teaching and scholarship? (3) What are their plans for faculty professional development and training in technology? (4) What resources are available to support computing, educational communications, and instructional technology in teacher preparation programs? (5) How are schools of education working with schools and colleges of letters and science to address these technology issues for beginning and practicing teachers?

The results of this survey showed considerable variation in how institutions were addressing these key issues. For example, many institutions were still relying on discrete courses in instructional technology, rather than developing models for systemic integration into the curriculum. Moreover, while some institutions articulated comprehensive plans for faculty development, others merely cited a listing of workshops. The evidence of university-wide planning and responsibility for teacher education technology development was also inconsistent and of uneven quality. It was evident from this initial scan that much work needed to be done at multiple organizational levels to advocate for technology infusion throughout the programs. Therefore, the Best Practices Task Force developed an institutional, team-based strategy.

In addition to the top-down approach, strategies and processes also were enacted at middle levels of the organization. Institutional teams were developed to discuss issues, collect data, and develop institution-specific plans to integrate technology throughout the teacher education curriculum. The teams consisted of administrators and faculty from the university and local PK-12 districts, as well as technical and instructional design support staff. The teams were required to submit reports to system administration around the key areas of teacher proficiencies, faculty development, and infrastructure requirements. A survey of the literature that was conducted at the inception of the project revealed that these three areas needed to be addressed in any comprehensive approach to technology in teacher education. All thirteen teams from throughout the university system met three times using compressed video technology. The discussions were co-facilitated by the system PK-16 director and rotated among selected faculty. At the compressed video meetings, campus teams shared issues, progress and results, and submitted one-page summaries of their discussions around the critical issues. The team-based effort culminated in a face-to-face statewide conference of all team members. The conference time was divided into discussions for functional groups and institutional teams. Individuals from across the system were placed into functional groups (deans, higher education faculty, technical support, etc.) and were asked questions designed to stimulate discussion and planning across institutions. The institutional team meetings were structured to enable the teams to initiate specific goals and action steps to develop their institutional plans.

Finally, each campus submitted a report to System Administration that outlined the campus plan to integrate technology into teacher education. Those plans will become the basis for a White Paper that will be submitted to the Board of Regents in February 2001. Besides reporting on the status of technology integration into teacher education, the White Papa will highlight institutional best practices. It will also contain specific system-wide policy and program recommendations. It is anticipated that the Board of Regents will incorporate these recommendations into a larger UW System PK-16 initiative and an action agenda.

Since effective change must be multi-directional, bottom-up approaches were also used to stimulate pilot, proof-of-concept projects at the individual faculty level. The system has provided incentive funding for teacher professional development projects that involve UW and PK-12 faculty working collaboratively on projects that utilize technology within the curriculum. In addition, the system has provided funding for fellowships that support UW faculty working collaboratively with PK-12 faculty on research projects that examine the impacts of technology on teacher behavior and student learning. The VIT^{2}AL Web site (www.vital.wisconsin.edu) contains a description of these programs as well as descriptions of all projects funded via these initiatives.

The following figure illustrates the entire change process:

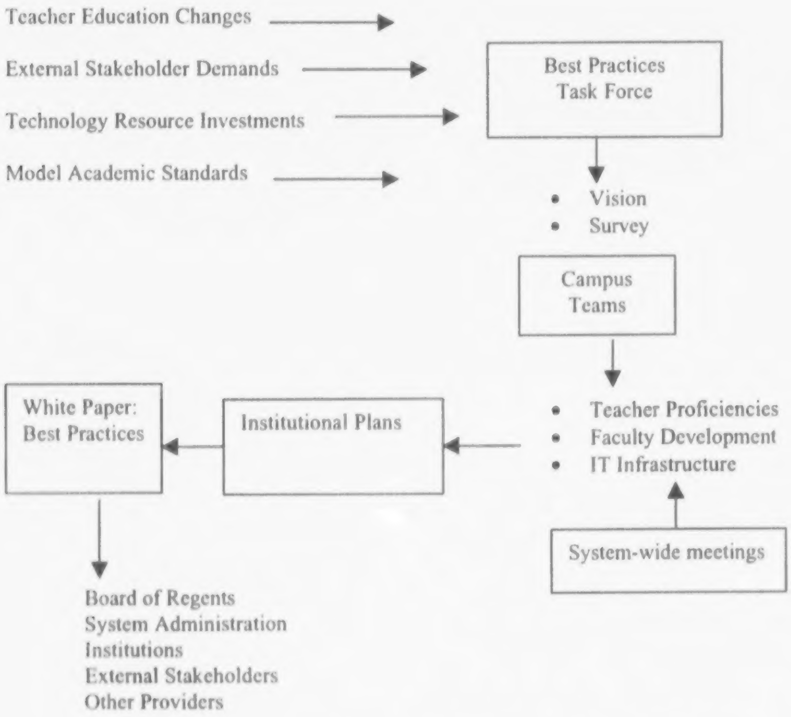

Teacher Education Changes
External Stakeholder Demands
Technology Resource Investments
Model Academic Standards
Best Practices Task Force
Vision
Survey
Campus Teams
Teacher Proficiencies
Faculty Development
IT Infrastructure
System-wide meetings
Institutional Plans
White Paper: Best Practices
Board of Regents
System Administration
Institutions
External Stakeholders
Other Providers

Figure 1: System-Wide Planning for Technology in Teacher Education

Outcomes: Results from Planning and Data Gathering Processes

The institutional teams addressed three questions separately in campus-based discussions, in three system-wide compressed videoconferences, and in their final campus plans submitted to System Administration. Those questions were (1) What do we want our teachers to know and be able to do when they leave teacher preparation programs? (2) What do our faculty need to know and be able to do to teach our students to use technology appropriately? (3) What are the infrastructure needs to accomplish student and faculty proficiency? Although these were dealt with separately, we were constantly reminded of the interrelationships between these issues.

Using a constant comparative method of analyzing the qualitative data from institutional reports (Conrad 1993; Maxwell 1998), six guiding principles emerged that informed and permeated the discussions of student skills and proficiencies, faculty development and leadership, and infrastructure requirements. Those principles included: (1) Caring and competent teachers would use technology with quality instructional practices and deep content knowledge. (2) Standards would form the basis for technology in teacher education; these would include adhering to ISTE's National Educational Technology Standards and Performance Indicators. In addition, Wisconsin's Model Academic Standards and technology standards for PK-12 students would inform teacher education practice. Technology integration would be part of systemic, standards-based reform. (3) Student-Centered technology integration would respond to needs of diverse learners and would focus ultimately on high achievement for all students. (4) Integrated technology throughout the curriculum, instead of technology grafted onto the curriculum through discrete courses would help ensure a systemic and long lasting impact on teaching and learning. (5) Lifelong Learning can be facilitated in technology-rich teacher education for both students and faculty by helping to foster learning communities. (6) Forward Thinking must always be a hallmark of technology planning; this encompasses not only includes keeping current with technological breakthroughs and changes, but in continuously improving curriculum and educational practice.

In terms of the teacher proficiencies, the institutional reports revealed that most students entering teacher education programs had a basic level of technology skill proficiency. However, it should be noted that programs were very sensitive to issues of the Digital Divide and students coming from socioeconomic or educational backgrounds that would impact negatively on their technology skills. Therefore, the plans provided support and remediation for students. The focus of the findings on teacher proficiencies resulted in identifying core proficiencies that would be articulated at the Beginning, Professional, and Master educator level (consistent with teacher education rule changes). Those proficiencies included (1) the collaborative use of technology; (2) technology as a learning tool; (3) responsible uses of technology (including ethical and legal issues); (4) and evaluating content.

Faculty use of technology would, at a minimum, require technology skills on par with students. But obviously the role of faculty as instructional leaders needed to be addressed. These leadership dispositions for higher education faculty were identified as mastering skills and core proficiencies, leadership consisting of initiative, collaboration and mentoring, and curriculum review and revision.

Discussions of institutional responsibility for infrastructure built upon the UW System's 1999-2001 Instructional Technology Plan in its requirements for equipment replacement cycles, wiring, software, technical and instructional design resources. What was unique to this plan, was the issue of university faculty working in collaboration with school districts and the resulting issues of unequal technical resources.

The Board of Regents will act upon the recommendations that have emerged from this process by the end of this academic year; without significant influx of resources (through reallocation and/or procuring new funding) and continued leadership it is unlikely that the effort will result in widespread, systematic change. Recommendations concerning teacher proficiencies will include the adoption of system-wide standards linked to categories of beginning, professional and master educator; measures to support students who need assistance to meet entry level requirements; technology proficiencies documented in student electronic portfolios; and teacher proficiencies tied to student achievement. Faculty leadership and professional development recommendations must include strong advocacy concerning the importance of technology integration into decisions regarding hiring, tenure, promotion, and merit. In addition, recommendations will foster better collaboration between schools of education/letters and science. In terms of infrastructure, recommendations will include the targeting of discretionary resources in course redesign (at campus and system levels) to teacher education, and system-wide academic systems to support faculty in the development of Web-based courses and resources. Finally, System Administration will recommend a long-term commitment to disseminate best practices through System-sponsored activities and resources. The Board will be encouraged to support a major budget initiative in the next biennial budget process (2003-2005) in teacher education, with a significant component related to technology integration.

Discussion

This has been an ambitious effort in system-wide planning within a context of facilitating policy and program change rather than mandating them. Lessons in leadership and change can be learned from this process and its results:

1. Stay focused within the organization. While there was initial pressure to engage private colleges and the technical colleges, we decided to focus our work internally, within a sphere or a circle of control where we could manage expectations and potentially bring about the most significant change. We plan to engage other providers later, in the next iteration of the ongoing planning and implementation processes.
2. Invite external stakeholders (state agencies, school districts, etc.) early in the planning stages to identify issues and engage support. External stakeholder involvement was crucial to maintaining a systemic approach to technology integration, lest the planning process become too focused on technology per se, rather than on technology for educational goals and outcomes.
3. Keep data collection simple. We used one-page worksheets for each of the campus reports on the major themes. While these worksheets did not yield detailed data, they did provide snapshots of the status of campus efforts; broad themes and trends could be identified. In a planning process that results in a system-wide effort, it is more important to have broad strokes than to have detail.
4. Anticipate variability and be prepared to explain variation and unevenness. The individual campus plans had to account for variation in mission, resources, and the regions in which campuses were located, among others. The challenge in a system-wide plan is to accept and even encourage differences, while encouraging systemic change. However, it must be noted that not all of the differences in campus reports could be attributed to justifiable differences. Many institutions' plans demonstrated less than a committed effort to address technology integration in a systematic way.
5. Employ multi-functional teams to include faculty, administrators, technical and instructional design support, as well as school district representatives. The multi-functional approach provides a process framework for underscoring a significant aspect of technology in education: that faculty can no longer operate as independent contractors. The success of their work is very dependent on teams of designers, technical support personnel and administrative leaders. In addition, we recommended that teams be represented by faculty who were novices in technology use as well as those described as experts. It was an important reality check to have novices (and even skeptics) involved in the planning process.
6. No one model or approach would work within a diverse system. This model of system-wide planning is consistent with general trends within the UW system, trends toward devolving decision-making from the central administration to the institutions, providing more incentives and rewards for institutional entrepreneurship, allowing more flexibility and experimentation. The current relationship between the central administration and the campuses is less governed by the need to regulate, mandate, and control and more consistent with organizational change that is facilitated, encouraged and supported. However, there continues to exist a larger regulatory environment that mandates rules for teacher program approval, for example. This process can be analyzed within a framework suggested by Dolence and Norris (1998) in which they contrast the processes of Industrial Age organizations with Information Age organizations. They characterize Industrial Age organizations with regulatory, centralized, faculty-centered, subsidized, dependent and existing

within a static and certain environment. Information Age organizations are decentralized, dynamic, student-centered, permissive and entrepreneurial. Unfortunately, the Information Age model does not totally square with the realty of technology planning within the state; evidence of both models exists within the current structure (both UW and the larger state environment) and any planning process must account for the ambiguity and tensions between these two.

Conclusion

This process began with an expectation of strategic change within a complex system. At this stage, it is a work-in-progress. Recommendations must be endorsed and implemented and continued work within the system and external to it must occur. Nevertheless, the process may be as important as the final product (s), whether those products be policy recommendations, funding, or programmatic directives. In the ambiguous, complex, recursive nature of planning in higher education, the very act of elevating an issue to the forefront of discussion, publicizing institutional activity and plans, inviting comparisons between and among institutions, can have a powerful impact on organizational change.

References

Conrad, C., Haworth, J. & Millar, S. (1993). *A silent success: Masters' education in the United States.* Baltimore, MD: Johns Hopkins University Press.

Dearing, B. (1972). Coordination: A view from the campus. In J. A. Perkins & B.B. Israel (Ed.), *Higher education: From autonomy to systems* (pp.50-71). New York, NY: International Council for Educational Development.

Dolence, M. G., & Norris, D.M. (1995). *Transforming higher education: A vision for learning in the 21st century.* Ann Arbor, MI: Society for College and University Planning.

Glenny, L. A. (1959). *Autonomy of public colleges: The challenge of coordination.* New York, NY: McGraw-Hill.

Halstead, D., K. (1974). *Statewide planning in higher education.* Washington, DC: U.S. Department of Health, Education, and Welfare.

Maxwell, J. A. (1998). Designing a qualitative study. In L. R. Bickman, Rog, D.J. (Ed.), *Handbook of applied social research methods* (pp. 69-100). Thousand Oaks, CA: Sage Publications.

Olcott, D. (1991). Bridging the gap: Distance learning and academic policy. *Continuing High Education Review,* 55(1-2), 49-59.

Weinstein, Laurence A. *Moving a battleship with your bare hands: governing a university system.* (1993). Madison, WI: Magna Publications.

The Relationship between Leadership, Self-efficacy, Computer Experience, Attitudes, and Teachers' Implementation of Computers in the Classroom

David M. Piper
Altoona Area School District
United States
piper@hollidaysburg.com

Wenfan Yan
Professional Studies in Education
Indiana University of Pennsylvania
United States
wyan@grove.iup.edu

Abstract: The purpose of this study is to examine the relationship between leadership, self-efficacy, computer experience, attitudes, and teachers' implementation of computers in the classroom. A total of 160 elementary and secondary teachers from eleven schools districts in Central Pennsylvania identified certain factors that may influence their practices of using computers in their classrooms. Three types of computer uses were identified and the variables of experience and knowledge, perception of leadership, self-efficacy, and attitudes toward computers were related to teachers' use of computers. Regression models demonstrated that with low and middle computer uses of clerical/management and academic use, self-efficacy demonstrated significance. As the computer use moved to advanced uses, such as web-page development and desktop-publishing, experience and knowledge, professional development and leadership became significance factors.

Purpose

Educational change does not occur as a result of an introduction of a new innovation, it occurs as the result of implementing the innovation in the classroom (Hall & Hord, 1987). Implementing computers into the classroom can only be effective if the teachers use them. Certain variables exist that influence, either positively or negatively, teachers' practices of using computers in the classroom. These variables include teachers' perceptions of leadership, teachers' self-efficacy, teachers' past experiences and knowledge, attitudes toward computers and certain school and teacher characteristics. This study looks at the influence and relationship these variables have on teachers' practices of implementing computers in their classroom.

Many schools are currently in the process of preparing strategic plans that integrate technology into the curriculum. Regardless of the content of each school's Technology Plan, the number of computers that sit in the classrooms, or the amount of money spent for technology, it is the teachers' actual practices in the classrooms that determine what role, if any, technology will play (Callister & Dunne, 1992).

This study examined the relationship between leadership, self-efficacy, computer experience, attitudes, and teachers' implementation of computers in the classroom. Facilitating technological change is not effective unless ultimately the teachers' practices are changed to include technology. This study provides insight into the relationship and influence certain variables have on teachers' practices of implementing computers into their classroom

Theoretical Framework

This study roots itself in the theoretical and conceptual constructs of change theory in education (Jorde-Bloom & Ford, 1988; Hall & Hord, 1987,). Conceptually, change does not occur in education with the introduction of an innovation; change occurs when the innovation is actually implemented (Hall & Hord, 1987). In order to facilitate this change process, change facilitators need to understand what influences teachers' practices of implementing an innovation.

Studies have identified the need for leadership and support to be present in order to achieve successful educational change (Brown, 1993; Leithwood, 1994; Schmitt, 1990). These studies differ in the style of leadership that is most effective in implementing change. Some studies support the motivational tactics of Transformational Leadership to induce change (Brown, 1993; Leithwood, 1994). Other studies favor the more direct style of Transactional Leadership (Fairholm & Fairholm, 1984; Schmitt, 1990).

Other studies suggest efficacy is an important factor to the success of this type of curricular change (Dawson, 1998; Jorde-Bloom & Ford, 1988). The teacher is the one that ultimately delivers the curriculum to the student. If the teacher is uncomfortable with the change or feels there is little chance of student improvement, it is likely that the change will not occur, or it will be instituted incorrectly (Callister & Dunne, 1993).

Although the two variables of leadership and efficacy are important to implementing change, research exists that also supports the role of prior knowledge and experience as an important influence in implementing change and using a computer (Jorde-Bloom & Ford 1988; Levine & Donitsa-Schmidt, 1997; Shashaani, 1997;). Still, other studies are present that suggest attitudes toward computers (Levine & Donitsa-Schmidt, 1997), and sex (Shashaani, 1997) may be variables that might impact teachers' efficacy and actual practices of using computers and accepting change. For change to be effective, facilitators must be cognizant of all the variables associated with change. The end result of a positive change in this case is teachers using computers.

This research hypothesizes that practices of teachers are influenced through a series of perceptions. The first perception is based on Bandura's (1977) Theory of Self-Efficacy that implies teachers tend to use practices and strategies that they feel can be effectively delivered by them and that will have a positive impact on student learning (Dawson, 1998). These self-efficacy traits or beliefs are usually built as a result of past practices and experiences (Duffee & Aikenwood, 1992).

This study conceptualizes further that certain variables such as perception of leadership also have an impact on teachers' practices (Hall & Hord, 1987; Huling, Hall, Hord, & Rutherford, 1983). Huling, Hall, Hord and Rutherford (1983) have indicated that a certain style used by the principal has a much greater innovation implementation rate. General attitude towards an innovation (Bandura, 1986; Levine & Donitsa-Schmidt, 1997) may have an influence on efficacy (Bandura, 1986) and perception of leadership (Bass, 1981). It is the relationship of all these variables that influence teachers' practices of deciding whether to implement the innovation.

Study Design

Public school districts were researched to determine their technology utilization and possible participation in this study. Minimum technological standards for this study required school districts to have Internet access to all buildings and for each building to have either an Internet ready computer lab or an Internet ready computer in every classroom.

A total of 160 elementary and secondary teachers from eleven schools districts in Central Pennsylvania participated in this study. Almost 29% of those surveyed represented elementary teachers who taught all subject areas. The remaining teachers represented specific subject areas ranging from 10% language arts teachers to 3.1% computer science teachers. Approximately 28% of the respondents were male, over 56% were under the age of 46, nearly 51% had less than 15 years of experience, and nearly 48% stated they received over 20 hours of professional development in computer training.

Each participant received a six part Likert Style survey that included sections on computer use, computer experience and knowledge, perception of leadership, self-efficacy, attitudes toward computers, and various teacher and school characteristics. The survey was designed using multiple instruments from other studies dealing with leadership, and teachers' use of technology (American Institute of Research, 1998; Bass & Avolio, 1995; Becker & Anderson, 1998; Dawson, 1998; Knezek & Christensen, 1997; Milken Family Foundation, 1998a, 1998b; U. S. Department of Education, 1998).

Factor analysis was used on all variables for data reduction methods. Reliability levels were obtained as follows: for computer uses.76 to .89, for experience and knowledge .82 to .93, for perception of leadership .69 to .92, for self-efficacy .90 to .97, and for computer attitude .94. Pearson Product Correlation and Multiple Regression models were used with significance levels at $p < .05$.

Computer usage was broken down into three categorical uses: clerical/management use, academic use, and advanced use. All three-computer uses require teachers to adapt their practices in one way or another. While all three uses require teachers to adapt to this innovation, clerical/management uses such as grade reporting, word processing and e-mail were considered the least invasive procedural change for teachers to make. In essence, these are the computer uses that are least likely to have a major impact on the traditional ways of teaching. The researcher considered this a basic level of use. Academic uses such as drill/practice, remediating deficiencies, improving writing skills, and challenging bright students were considered intermediate use. Advanced uses such as web-page development and desktop publishing were considered higher order computer uses.

The study asked questions regarding the teachers' experience and knowledge about computers, the teachers' perception of leadership as it relates to technology implementation, the teachers' self-efficacy in computer use, and the teachers' attitudes toward computers. The researcher addressed questions relating to school and teacher characteristics such as age, sex, average class size, and professional development.

Findings

Approximately 92% of the teachers in this survey use computers to assist with one or more of their responsibilities as a teacher. Significant positive correlations were noted between: (a) application/Windows experience and transformational/reward, (b) application/Windows experience and self-efficacy in instructional, Internet, and computer application use, (c) application/Windows experience and computer attitudes, (d) Macintosh experience and self-efficacy in Internet and computer application use, (e) Macintosh experience and computer attitudes, (f) transformational/reward and self-efficacy in instructional and Internet use, (g) transformational/reward and computer attitudes, and (h) computer attitudes and self-efficacy in instructional, Internet and computer application use. A significant negative correlation was noted between computer attitudes and idealized influence (See Table 1).

	Acad Use	Cler Use	Adv Use	App Exp	Mac Exp	Tran Rew	Trans	Inspi Moti	Ideal Infl	Instr Self-	Inter Self-	App Self-	Com Att
Academic Use	1.00												
Clerical use	1.00	1.00											
Advanced Use	1.00	1.00	1.00										
Application Exp.	.16*	.52**	.52**	1.00									
Macintosh Experience	.32**	.21**	-.09	.00	1.00								
Transformational/Rew	.19*	.15	.29**	.18*	.16	1.00							
Transactional	-.04	-.11	.04	-.01	-.09	.00	1.00						
Isnpirational Motivation	.00	.03	.03	-.08	.02	.00	.00	1.00					
Idealized Influence	-.11	-.18*	.08	-.05	-.12	.00	.00	.00	1.00				
Self-Efficacy Instructional Use	.41**	.34**	.17*	.33**	.17*	.28**	-.01	-.01	-.02	1.00			
Self-Efficacy in internet Use	.24**	.14	.24**	.48**	.33**	.20*	-.04	-.06	-.09	.00	1.00		
Application Self-Efficacy	.11	.49**	.16	.58**	.27**	-.01	-.03	.05	-.15	.00	.00	1.00	
Computer Attitudes	.24**	.38**	.22**	.44**	.24**	.30**	-.07	.13	-.18*	.30*	.20*	.41**	1.00

*p < .05, ** p < .01

Table 1. Pearson Correlations among Computer Use and Knowledge and Experience, Perception of Leadership, Self-Efficacy, and Attitudes toward Computer

Experience and knowledge have a positive influence on academic, clerical/management and advanced computer uses. Application and Windows experience showed positive correlations to all three-computer uses. Macintosh experience demonstrated a significant positive influence on clerical/management and academic uses of computers.

Perception of leadership showed a significant influence on all three-computer uses. An aspect of leadership that combines some transformational leadership attributes, along with contingent reward, has demonstrated significant positive influence on academic and advanced uses. Another aspect of leadership identified as idealized influence demonstrated a significant negative influence on clerical/management use.

Self-efficacy demonstrated significant positive influence on all three-computer uses. Self-efficacy in instructional use of computers demonstrated significant positive influence on all three-computer uses. Self-efficacy in Internet use demonstrated significant positive influence on academic and advanced uses of computers. Self-efficacy in computer applications demonstrated significant positive influence on clerical/management use of computers.

Attitudes toward computers demonstrated significant positive influence on academic, clerical/management and advanced uses of computers. The highest influence of computer attitudes was on clerical/management use (See Table 1).

	Clerical/Management Use			Academic Use			Advanced Use		
Independent Variables	B	SE	t	B	SE	t	B	SE	t
School Characteristics									
Access to Internet	-1.19	.85	-1.41	1.85	.91	2.04*	-.18	.88	-.20
Access to a Computer in the Classroom	.11	.31	.35	.59	.33	1.79	.21	.32	.66
Average Class Size	-.08	.06	-1.21	.10	.07	1.52	.00	.07	.00
Teacher Characteristics									
Age	-.05	.04	-1.22	-.03	.05	-.63	.00	.05	-.10
Sex	.01	.19	-.06	.11	.20	.55	-.48	.20	-2.44*
Professional Development	-.05	.06	-1.00	.08	.06	1.41	.13	.06	2.24*
Level Taught	.03	.10	.29	-.05	.10	-.52	.02	.10	.18
Experience and Knowledge									
Application/Windows	.20	.19	1.04	-.23	.20	-1.15	-.73	.20	3.74**
Macintosh	.05	.12	.38	.13	.13	1.01	.01	.12	.09
Perception of Leadership									
Transformation/Reward	-.11	.09	-1.27	.15	.10	1.60	.19	.09	2.09*
Transactional	-.06	.08	-.79	-.01	.08	-.08	.00	.08	-.06
Inspirational Motivation	.04	.09	.48	-.08	.09	-.87	.10	.09	1.06
Idealized Influence	-.06	.09	-.69	-.05	.09	-.57	.03	.09	.39
Self-Efficacy									
Self-efficacy in instructional use	.31	.11	2.71**	.28	.12	2.27*	-.19	.12	-1.63
Self-efficacy in internet use	-.01	.14	-.07	.18	.15	.85	-.14	.15	-.92
Application Self-Efficacy	.33	.16	2.15*	.09	.17	.52	-.30	.16	-1.90
Attitudes Towards Computer									
Computer attitudes	.02	.10	.24	.08	.17	.52	.03	.10	.30
Constant	2.70			-5.28			.33		
R^2	.43			.38			.46		

$p < .05$, ** $p < .01$, *** $p < .001$

Table 2. Multiple Regression Models for Clerical/Management, Academic, and Advanced Uses of Computers and School Characteristics, Teacher Characteristics, Experience and Knowledge, Perception of Leadership, Self-efficacy and Attitudes toward Computers

Table 2 summarizes the results of the multiple regression models used for this study. A multiple regression model that identified 43% of the variance in the dependent variable clerical/management use of computers found significant relationship between clerical/management use and the independent variables self-efficacy in instructional use and self-efficacy in application use. A multiple regression model that identified 38% of the variance in the dependent variable academic use of computers found significant relationships between academic use and the independent variables instructional self-efficacy and access to the Internet. A multiple regression model that identified 46% of the variance in the dependent variable advanced use of computers found significant relationships between advanced use and the independent variables sex, professional development, application/Windows experience, and transformational/reward leadership styles. The results of this study demonstrated that as teachers move up the ladder of computer use, the significance of variables such as access to computer tools and self-efficacy diminishes, while the importance of experience and knowledge, perception of leadership and the characteristics of teachers increases. These findings support the research on Levels of Use and Stages of Concern (Hall & Hord, 1987) regarding the implementation of innovations.

Educational Importance

Each of the independent variables has demonstrated either an influence or a relationship with all three-computer uses. While the impact of each independent variable varies with each computer use, each indicates a particular observation. Given the assertion that the use of computers ranged from the lowest level of use, clerical/management use, to the highest level of use, advanced use, the regression models indicate that the significance and relationship of the variables, to the specific use, changes.

The independent variable self-efficacy demonstrates significance in the regression model for the dependent variable clerical/management use. The regression model for the dependent variable academic use shows a relationship with self-efficacy and access to Internet. The regression model for the dependent variable advanced use shows a relationship between experience and knowledge, perception of leadership, and the teacher characteristics of sex and professional development.

As we moved up the ladder of computer use the significance of access to computer tools and self-efficacy diminishes while the importance of experience and knowledge, perception of leadership and the characteristic of teachers increase. This supports the research on Levels of Use and Stages of Concerns (Hall & Hord, 1987). The Levels of Use model basically identifies that people exist at differing levels of use when an innovation is implemented depending on certain variables. The Stages of Concern model suggests that a very different sequence of concerns emerge from experienced versus inexperienced users.

Lewin (1951) realized that when change occurs, there will be forces for change and forces against change, and that change will occur when forces for change outweigh forces against change. Lewin observed that change occurs only when attitudes and behaviors are different than they were before. To support change we need to understand what factors influence attitudes and behaviors. This study offers insight into the importance of understanding the factors that influence the implementation of innovations.

By realizing that certain factors have an influence on teachers' decisions to implement an innovation, leaders and change facilitators can begin to understand what they can do to help promote the implementation process. They can do this by understanding what factors influence teachers' decisions to implement an innovation, how the leader's interactions affect those factors, and how to promote the implementation by positively influencing the factors involved in teachers' decisions to implement the innovation.

The factors under consideration for this study included experience and knowledge, perception of leadership, self-efficacy and attitudes toward computers. While only one of these factors, perception of leadership, is under the direct control of the leader or change facilitator, the actions of the leader can influence the other factors (Bass, 1981; Dawson, 1998; Jorde-Bloom & Ford, 1988).

This study also gave insight into the understanding that teachers implement innovations such as computers in differing degrees and levels (Hall & Hord, 1988). As a result, factors that influence each level of implementation will likely change. Therefore, leaders must understand this phenomenon and plan the change process accordingly. While experience and knowledge, self-efficacy, and attitudes toward computers are perceptive traits decided by the teacher, the leader's action, or lack of action, would have an effect on those perceptions and ultimately the implementation of the innovation.

References

American Institute of Research (1998). In U. S. Department of Education's, *An educator's guide to evaluating the use of technology in schools and classrooms*, Washington, DC: U. S. Department of Education.

Bass, B. M. (1981). *Stogdill's handbook of leadership*. New York: The Free Press.

Bass, B. M. & Avolio, B. J. (1995). *MLQ multifactor leadership questionnaire for research: permission set*. Redwood City, California: Mind Garden.

Bandura, A. (1977). Self Efficacy: Toward a unifying theory of behavior change, Psychological Review, 84(2), 191-215.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Becker, H. J. & Anderson, R. E. (1998). *Teaching learning and computing: 1998.* [On-line]. Available: http://www.crito.uci.edu/tlc.

Brown, J. (1993). Leadership for school improvement. *Emergency Librarian, 20*(3), 8-20.

Callister, T. A. & Dunne, F. (1993). The computer as a doorstep: Technology as disempowerment. *Phi Delta Kappa 74*, 324-326.

Dawson, K. M. (1998). *Factors influencing elementry teachers' instructional use of computers.* Ann Arbor, Michigan: UMI Dissertation Services.

Duffee, L. & Aikenhead, G. (1992). Curriculum change, student evaluation and teacher practical knowledge. *Science Education, 76*(5), 493-506.

Fariholm, G. & Fariholm, B. C. (1984). Sixteen power tactics principals can use to improve effectiveness. *NASSP Bulletin, 68*(485), 68-75.

Hall, G. E. & Hord, S. M. (1987). *Change in schools: Facilitating the process,* New York: State University of New York Press.

Huling, L.L., Hall, G. E., Hord, S. M. & Rutherford, W. L. (1983*). A multi-dimensional approach for assessing implementation success.* (Report No. 3157). Austin. The University of Texas at Austin. Research and Development Center for Teacher Education. (ERIC Document ED 250 328).

Jorde-Bloom, P. & Ford, M. (1988). Factors influencing early childhood administrators' decisions regarding the adoption of computer technology. *Journal of Educational Computing Research, 4*(1), 31-47.

Knezek, G. & Christensen, R. (1997, 1999) *Internal consistency reliability for teacher's attitudes towards informational technology (TAT) questionnaire* [On-line] Available: *http://www.tcet.unt.edu/research.*

Leithwood, K. (1994). Leadership for school restructuring. *Educational Administration Quarterly, 30*(4), 498 – 519.

Levine, T. & Donitsa-Schmidt, S. (1997). Commitment to learning: Effects of computer experience, confidence and attitudes. *Journal of Educational Computing Research, 16*(1), 83-107.

Lewin, K. (1951). *Field theory in social science.* New York: Harper.

Milken Family Foundation. (1998a). *Survey of highly effective technology-using teachers* [On-line]. Available: *http://www.mff.org/Tango3/survey/teachersurvey.taf.*

Milken Family Foundation. (1998b). *California digital high school program process evaluation survey* [On-line]. Available: http://www.mff.org.

Schmitt, D. R. (1990). The effect a principal has on the effective school program. Paper presented at the annual meeting of the Association of Louisiana Evaluators (New Orleans, LA: September, 1990). ERIC Document 330 089.

Shashaani, L. (1997). Gender differences in computer attitudes and use among college students. *Computers and the Humanities, 30*, 37-51.

U. S. Department of Education. (1998*). An educator's guide to evaluating the use of technology in schools and classrooms.* Washington, DC: U. S. Department of Education.

A Multimedia Design for Leadership Training:
From Process to Product

Hanadi Saleh
Florida Atlantic University
rabdalou@hotmail.com

Roberta K. Weber
Department of Educational Technology & Research
Florida Atlantic University USA
rweber@fau.edu

Abstract: Training future educational leaders utilizing a variety of multimedia produced modules provides an excellent opportunity for introducing the benefits of well-designed courseware and the possibilities of exploring interactive computer-based instruction. This paper discusses the development of a software program that will be used at the graduate level by current and prospective leaders in the educational environment. This unit of instruction consists of content delivered in an educational organization course dealing with administrative theory developed with the Authorware program.

Introduction

Teaching leadership theories could provide a more pleasant and easier task when the instructional units are supported by interactive multimedia-based activities that stimulate learners to engage in higher order thinking (Alessi & Trollip ,1991). According to Thomas & Marium (1999), "Playing games in a graduate class for instructional leaders may seem childish. But the 'proster theory' asserts that the upper most part of the brain functions best when the environment is supportive and non-threatening" (p. 727). This unit was designed using the systematic approach for instructional design suggested by several authors, (Kemp, Morrison, & Ross , 1998; Dick, Carey, & Carey ,2000; Newby, Stepich, Lehman, & Russell, 2000) through an in-depth process, spanning two semesters.

Authorware, by Macromedia, was used to produce the instructional CD. One unit of instruction was designed for adult learners enrolled in the Educational Leadership Department at the Lebanese University, Beirut, Lebanon. This CD could also be relevant for use in American universities. Macromedia Authorware was selected as the program of choice because it allows for the development of interactive instructional units without the technically demanding task of computer programming (Kellogg, 1999). A demo of the CD will be provided along with a discussion of the process involved in the development of the unit.

Instructional Objectives

1. The learners will be able to state the definition of "Servant Leadership."
2. The learners will be able to recognize the six characteristics of the servant leadership.
3. The learners will be able to compare and contrast servant leadership with more traditional leadership styles.

The content for this unit came from an educational leadership course taken at Florida Atlantic University. The Servant Leadership theory posits that "It begins with the natural feeling that one wants to serve, is to serve *first*. Then conscious choice brings one to aspire to lead" (Greenleaf, 1970, p.1). This module was developed to engage the learner in a multi-sensory and interactive introduction to Servant Leadership theory. Servant Leadership has six characteristics (Laub, 1999). They are:

1. Display authenticity
2. Value people
3. Develop people

4. Build community
5. Provide leadership
6. Share leadership/vision

Project Rational

As the integration of technology into the teaching and learning process continues to be adopted into all educational environments, it becomes increasingly important to support instruction with the use of technological innovations. The aim of this project was twofold: (a) to integrate technology into instruction; and (b) to prepare the students to be instructional leaders in using technology.

The four stages of the instructional unit include:

1. Review the results of the assessment that the learners had in the previous class.
2. Introduce the Servant Leadership concept.
3. Present the six characteristics of the Servant Leadership.
4. Involve the learners in interactive activities that review the whole content of the class.

References

Alessi, S. M. & Trollip, S. R. (1991). *Computer- based instruction.* Englewood Cliffs, NJ: Prentice Hall.

Dick, W., Carey, L. & Carey, J. O. (2001). *The systematic design of instruction* (5th Ed). New York, NY: Addison-Wesley Educational Publishers.

Greenleaf, R. K. (1970). http://www.colstate.edu/servant/

Kellogg, O. (1999). *Macromedia authorware 5 attain authorized.* Berkeley, CA: Macromedia Press, in association with Peachpit Press.

Kemp, J. E., Morrison, G. R. & Ross, S. M. (1998). *Designing effective instruction* (2nd Ed). Upper Saddle River, NJ: Prentice Hall.

Laub, J. A. (1999). Assessing the servant organization: development of the servant organizational leadership assessment (SOLA) instrument. Doctoral Dissertation, Florida Atlantic University, 1999.

Newby, N. J., Stepich, D. A., Lehman, J.D. & Russell, J. D. (2000). *Instructional technology for teaching and Learning- Designing instruction, integrating computers, and using media* (2nd Ed). Upper Saddle River, NJ: Prentice Hall.

Thomas, D. & Marium, W. (1999). Using a game-format to teach national educational standards to aspiring school administrators. *Education*, 119(4), 727-79.

Models of Instructional Technology Leadership in U.S. Schools

Mary B. Shoffner, Ph.D.
Middle Secondary Education & Instructional Technology Department
Georgia State University
United States
mshoffner@gsu.edu

Abstract: Recent studies indicate that half of all teachers who have access to technology in their schools do not make use of it in their instruction. The time has come for states and school districts to examine the potential of instructional technology leadership in the schools to address teacher training and support needs. In considering what type of roles instructional technology leaders might play in the schools, it is prudent to examine what models are already in place. An exploratory national survey was conducted to determine the presence of licensed IT professionals in school-based settings. Results were gathered through multiple channels: via the Internet, e-mail, and telephone interview. Results and implications of the study are presented.

Introduction

Although significant strides have been made in the effort to increase technology integration into K-12 classrooms, efforts still fall short. According to a recent study by the National Center for Educational Statistics (2000), "Nearly all public school teachers (99 percent) reported having computers available somewhere in their schools in 1999; 84 percent had computers in their classrooms, and 95 percent had computers available elsewhere in the school"(p. ii). However, these same teachers were not necessarily making use of these technology resources in their instruction. "Approximately half of the public school teachers who had computers or the Internet available in their schools used them for classroom instruction" (NCES, 2000, p. I). Only half. The question remains, where are we falling short?

Initial concerns that preservice teachers were not being adequately prepared to integrate technology in their instruction are being addressed. Several factors have been cited as hindering new teacher use of technology. These include inadequate training in the proper technology skills and methods, lack of technology modeling on the part of their university faculty, lack of positive technology experience in school settings, and university faculty out-of-touch with the technology explosion in schools and how it is effecting teaching practice (Kent & McNergnery, 1999; National Council for Accreditation of Teacher Education, 1997; Persichitte, Tharp, & Cafarella, 1997; Office of Technology Assessment, 1995; Byrum & Cashman, 1993). The re-design of entire teacher education programs is called for. The *Preparing Tomorrow's Teacher's to Use Technology* grant program has awarded greater than 75 million dollars to address this specific problem. In addition, standards have been adopted to serve as benchmarks to measure new teacher technology and technology integration skills. In June 2000, the *National Educational Technology Standards for Teachers* (NETS-T) were introduced and adopted by the National Council for Accreditation of Teacher Education (NCATE) effective for site visits beginning 2001.

However, the NCES study, *Teachers' Tools for the* 21^{st} *Century* (2000) reported that less-experienced [*new*] teachers were much more likely than their more experienced colleagues to indicate that this [*college and graduate work*] prepared them to use computers and the Internet" (p. iii). 84 percent of novice teachers (3 years classroom experience or less) indicated that college and/or graduate work prepared them to some extent to use computers and the Internet. It would seem that inroads are being made into preparing tomorrow's teacher workforce.

But what can be done to assist today's teachers? Nearly half of all teachers who have access to technology do not make use of it in their classrooms (NCES, 2000). What barriers do they claim hinder their progress? While most inservice teachers indicated that time (82%) and access (78%) are still primary issues, training and support are also largely cited as barriers (NCES, 2000). Teachers cited lack of support regarding ways to integrate telecommunications into the curriculum (68%), inadequate training opportunities (67%), lack of technical support or advice (64%) and lack of administrative support (43%) as additional barriers to successful technology integration. As districts race to address at least the access issue, purchasing hardware and software, perhaps it is time to address training and support for the practicing teacher. The time has come for schools to establish instructional technology leadership positions.

NCATE recognizes standards for technology literacy at two levels beyond that of the typical teacher. The first is the *Basic Endorsement in Educational Computing and Technology Literacy*. The second is the *Standards for Advanced Programs in Educational Computing and Technology Leadership*. While the technology literacy endorsement focuses on the classroom use of technology, the technology leadership standards indicate the preparation of an educator who would act in a instructional specialist role, both training teachers and consulting with teachers and supporting teachers in effective technology integration in the classroom.

Description of the Study

In considering what type of roles instructional technology leaders might play in the schools, it is prudent to first determine what models are already in place. An exploratory national survey was conducted to determine the presence of licensed IT professionals in the school-based setting. Results were gathered through multiple channels: via the Internet (searching state department of education websites), through e-mail with identified licensure agencies or IT officials at the state level and IT licensure preparation programs at the university level, and by conducting telephone interviews with licensure agencies or IT officials in the department of education of states studied. Questions addressed the following areas:

- Does the state have a certification or licensure for the IT professional in the school?
- What is the type and title of the certification (what is the job title)?
- How long has this licensure been in effect?
- Is a teaching certificate required as a prerequisite to the IT licensure?
- If present, what are the IT licensure requirements?
- Does the state also have Library Media Specialist certification or licensure?
- If so, how does the role of the IT "specialist" differ from that of the Library Media Specialist?
- If present, does the state determine the model of IT "specialist" placement, or is it determined at the district level?

The results of the study are presented below.

But first...

Due to the lack of consensus on the terminology and the definition of IT professional in different states, the interviewers requested information on the licensure rules for not just IT specialists, but also technology coordinators who may play similar roles to instructional technologists. During the survey, some interviewed officials required the interviewer to clarify the term "instructional technology specialist" since this job title was not adopted in their states, and they were not familiar with the role played by IT specialists. In order to gather as much data as possible, the interviewers supplied an informal and broad definition for IT professional, and in the later interviews requested for licensure information on any kind of "technology person in public schools." In this paper, the term "IT professional" is used to refer to the variety of titles applied to the certified instructional technologists in this study, and the roles they may fulfill in school-based settings.

Results

States with Instructional Technology Certification or Licensure

Of all fifty states surveyed, seven states were identified as possessing licensure requirements for instructional technology (IT) professionals in the schools. Those states include Pennsylvania, Maine, Massachusetts, New Hampshire, New Mexico, North Carolina, and Wisconsin. In addition, at the time of the study, the Vermont State Board of Education was processing a proposal for Technology Coordinator Endorsement certification, anticipating adoption for the 2000-2001 school year. These eight states have already formulated explicit licensure rules for IT professional, and this licensure information served as the focus of this study.

Lack of Standardization on the Type and Title of the Certification

The eight states differed from each other in terms of the type and title for IT licensure. IT related certifications were in the form of an endorsement or add-on to an existing teaching certificate in three states: Maine, New Mexico, and Vermont. In the other states, however, IT certifications were stand-alone licenses. Moreover, the states adopted a variety of titles for IT related certificates. Only three states (Pennsylvania, Massachusetts, and North Carolina) adopted the term "Instructional Technology Specialist" for IT certification. Three states used the term "coordinator" as part of the title -- "Technology Coordinator" in Vermont, "Instructional Technology Coordinator" in Wisconsin, and "Information Technology Coordinator" in New Mexico. The remaining two states used a variation of "computer teacher" for IT certification. In Maine, the endorsement for "Computer Technology Teacher" also applies to district-level technology coordinators. New Hampshire requires that technology coordinators obtain "Computer Educator" certification. A licensure official in New Hampshire commented that it was considered convenient to set up one set of rules and apply them to both computer teachers and technology coordinators.

Certification for IT Professionals: A Recent Phenomenon

Instructional Technology certification has a short history. The earliest state to implement IT certification was Pennsylvania in 1987. Wisconsin issued an IT certificate for audio-visual directors effective starting from 1986, but this license was terminated in the new licensure rules approved in February, 2000, because it is believed in Wisconsin that "Instructional Technology specialist position has focused on the effort to increase the ability of all teachers to use technology effectively," and all teachers should be competent in technology. In Wisconsin, a licensed teacher can act in the capacity of IT Specialist without further licensing. Except for North Carolina, which implemented IT certification in the early 1990s, the remaining states adopted IT certification only recently: Maine and Massachusetts in 1996, and New Mexico and New Hampshire in 1999. At the time of this study, the state of Vermont was still processing the proposal for an IT Coordinator certification.

Variations on Teaching Certificate as a Prerequisite

The eight states vary as to whether a teaching certificate should be a prerequisite for obtaining an IT related certificate. By definition, the three states which award IT certification as an endorsement or add-on to the initial teaching certification require prior initial teaching licensure (Maine, New Mexico, and Vermont). In Wisconsin, IT certification is an administrative certification, and requires initial teaching certification as well as three years teaching experience as a classroom teacher. The remaining states did not explicitly specify the prerequisite of a teaching license at the state level if the applicant completes a master's degree or equivalent program in IT related field, but the other alternative to the certification (when the applicant does not have a required degree) necessitates a standard teaching certificate. Moreover, the absence of explicit requirement for a teaching certificate for those who hold a relevant degree does not necessarily mean that teaching license is not required. An official at the Bureau of Teacher Certification in

Pennsylvania responded that a teaching certificate could be a local school district's prerequisite or that of an institute of higher education which offers the program of study even though it is not a state requirement. Furthermore, in the state of North Carolina, a teaching certificate is not mandatory before acquiring IT Specialist certification, but it is directly related to the pay for IT professionals, who need at least 2 years teaching experience to attain master-level pay.

Similarities and Differences on Licensure Requirements

Regardless of the disparity of the states with respect to the types and titles of IT related certifications, the eight states share some similarities in licensure requirements. First, a dual emphasis was put on both the technical competencies and the knowledge and abilities of the IT professionals to integrate computer technology into the curriculum. Second, IT professionals are expected to perform a wide variety of roles instead of simply functioning as computer technicians. They are required to be proficient not only in computer and technology operations, installation, and maintenance, but more importantly, in the areas of technology application in teaching and learning, educational and technology-related research and theories, facilities and resource management, professional development, and technology leadership.

While the eight states agree on a broad role for IT professionals, their licensure requirements differ from each other in terms of the degree of specification and the points of emphasis for the required knowledge and skills. Maine underscores computer proficiencies, which are broken down into many sub-areas in the licensure rules, whereas the teaching-related knowledge is mentioned only briefly. New Mexico attaches special importance to the research abilities required of Technology Coordinators.

Differentiation of the Role of IT professionals from that of Library Media Specialists

Many of the IT graduate programs originated from audio-visual programs, and IT professionals employed in the schools were traditionally regarded as media services personnel. This tradition was believed to have deterred the development of the field of *instructional* technology in school-based settings. In this study, we found that the role of IT professionals is distinguished from that of Library Media Specialist in all the eight states. In addition, all eight states recognize and award IT professional and Library Media Specialist as two different certificates. In the states studied, Library Media Specialists are found to work usually in the library and are responsible for the production, management, and organization of library media. In contrast, IT professionals are concerned with technology support and curriculum integration, especially the use of information technology in education. Since the certification for IT professionals and the discrimination of the role of Library Media Specialist from that of IT professionals are fairly recent trends, real-world practice as yet does not reflect this in some of the eight states. In New Mexico, where the endorsement for Information Technology Coordinators was just approved in September 1999, many of the IT Coordinator positions are still served by Library Media Specialists. In Vermont, where the endorsement for IT Coordinator was not yet adopted, the interviewed information technology official stated that a Library Media Specialist can be assigned as a IT Coordinator as long as she/he meets the new standard for IT Coordinators.

Absence of Statewide Staffing Model for IT Professionals

There is no consistent model of staffing for certified IT professional in the schools from state to state, or even within certifying states. Unlike the standard for Library Media Specialists, no state reported any statewide model of required staffing for IT professionals. It is up to the local school district to make the decision on whether or not to fund and staff IT positions. Moreover, since IT certification is a rather new practice, staffing is a very flexible situation in many states. It varied from district to district and school to school. Pennsylvania did indicate that the IT Specialists most often worked at the district-level, and would often supervise non-certified computer technicians at each school. In addition, Pennsylvania school districts may employ IT Specialists in the field, particularly in larger schools. In Vermont, some small schools have no IT professional assigned, but some bigger schools do.

Implications of IT Certification

While few will argue the need for increased instructional technology training and support for inservice teachers, there is no agreement that certified IT professionals in the schools are the answer. Interviewees raised several arguments both for and against IT certification.

Potential Benefits of IT Certification

Potential benefits of IT certification were offered by officials from states awarding certification as well as from those that did not. One official proposed that the presence of IT certification itself brings validation and credibility to the use of instructional technology in the classroom. As more states require IT competencies for teaching certification and certification renewal, the importance of these requirements are supported by the employment of licensed IT support personnel. The differentiation between IT Specialist and Library Media Specialist roles allows the Library Media Specialist to focus on what they were trained to do, instead of "wearing too many hats." Another official offered that state-level certification might lead to consistent terminology, roles, placement, and especially pay for IT professional employed in schools. Where IT certification exists, districts and schools have established criteria to make informed hiring decisions.

Arguments Against IT Certification

Not all agree with the concept of certified IT support positions in schools. One interviewee stated that if state mandates for IT competency for initial and renewable teaching certification are successful, that certified IT support personnel would not be needed. Teachers who are particularly proficient or computer savvy could fulfill these support needs when they arise. Along this same line, some states prefer to focus on technology (hardware, software, and networking) needs, and to leave the instructional support role to existing Instructional Specialists. These states prefer to hire IT personnel based on technical certifications (such as Microsoft) that are awarded elsewhere.

Conclusions

Growing Attention to IT in all States

Although only eight states were found to have established or are in the process of establishing certification for Instructional Technology, the emphasis on integrating technology into education was evident in all states. Officials in many states currently without IT certification expressed hope that certification for IT professionals can be adopted in their states. Moreover, almost all of those interviewed indicated their states were attaching an increasing importance to the technology component in education. In addition, officials from many states stressed an increasing attention to raising the technology competency of all teachers.

As more states address technology integration as a required teacher competency for initial licensure and licensure renewal, it is likely that existing instructional support levels in place in schools will be strained. As each state strives to increase technology integration, we must consider how to best meet the needs of inservice teachers in terms of training and support. What must be kept in mind is that teachers will need training in more than hardware and software, but especially in the areas of learning environments, alternative assessment, cooperative learning, information literacy, visual literacy, lifelong learning, and self-directed learning. We must also consider that technology changes, and as such, the training and support of inservice teachers in technology integration will need to be continual and on going. A certified instructional support person trained in instructional technology and teaching methods may be the answer.

References

Byrum, D.C., & Cashman, C. (1993). Preservice teacher training in educational computing: Problems, perceptions, and preparation. *Journal of Technology and Teacher Education, 1,* 259-274.

Kent, T.W., & McNergney, R.F. (1999). *Will technology really change education: From blackboard to web.* Thousand Oaks, CA: Corwin Press.

National Center for Educational Statistics. (2000). *Teachers tools for the 21^{st} century.* [Online]. Available: http://nces.ed.gov/pubresearch/pubsinfo.asp?pubid2000102

National Council for Accreditation of Teacher Education. (1997). *Technology and the new professional teacher: Preparing for the 21^{st} century classroom.* [Online]. Available: http://www.ncate.org/projects/tech/TECH.HTM . Accessed May 12,1999.

Office of Technology Assessment, U.S. Congress. (1995). *Teachers and technology: Making the connection.* Washington, DC: Author.

Persichitte, K.A., Tharp, D.D., & Cafarella, E.P. (1997). *The use of technology by schools, colleges, and departments of education.* Washington, DC: American Association of Colleges for Teacher Education.

Acknowledgments

The author wishes to express sincere gratitude to Ms. Yuxin Ma, doctoral student at Georgia State University, for her diligent research and analysis in the completion of this study. Appreciation is also extended to Dr. Beverly Armento for her support of this research, and to Drs. Laurie Dias, Steve Harmon, and Skip Atkinson for their input and thoughts.

Infusing Technology into Leadership Preparation

Dr. Helen C. Sobehart
Director, Leadership Institute and Interdisciplinary Doctoral Program for Educational Leaders
Duquesne University
United States
sobehart@duq.edu

Dr. Larry Tomei
Assistant Professor, Department of Instruction and Leadership in Education
Duquesne University
United States
tomei@duq.edu

Janet Sloand Armstrong
Director
Instructional Support Center
United States
Jarmstrong@pattan.k12.pa.us

Abstract: As we prepare teachers for technological competence necessary in this new century, we must assure that those who administer the educational systems in which teachers work also have the technological competence to support the work of the educators. This paper discusses how technological competence has been infused into the context of the curriculum of a doctoral program which prepares superintendents and other leaders based on AASA and Pennsylvania standards. The curriculum consists of eight domain areas, plus research skills. Technological competencies have been infused into the leadership curriculum. This paper describes those competencies, with descriptive examples of technological infusion.

Introduction

In 1993, the Duquesne University School of Education in Pittsburgh, Pennsylvania founded the innovative Interdisciplinary Doctoral Program for Educational Leaders (IDPEL). Based on the American Association of School Administrators (AASA) Standards, leadership research, and two years of planning with faculty and practitioners, this cohort program produced a first class that greatly improved upon the national ABD (All But Dissertation) rate, and raised the professional status of most of it's graduates to CEO, Assistant CEO and other executive level leadership positions. As subsequent cohorts follow a similar path, this program, committed to continuous improvement, recognized the need to systematically infuse the use of technology into the leadership curriculum of the program. This paper describes the program itself, it's major curricular objectives, the technological objectives that have been infused into the curriculum, and provides examples of technological outcomes.

The IDPEL program is based on the following mission and belief statements:

> *The mission of the Duquesne University Interdisciplinary Doctoral Program for Educational Leaders is to develop educators who will have the vision and the skills to move the American educational system to prominence in tomorrow's world. This will be accomplished through an innovative partnership program linking competence and the learner, University faculty, practicing educational administrators, and community leaders.*

The Mission and all the instructional activities of the Interdisciplinary Doctoral Program for Educational Leaders (IDPEL) strands are rooted in several strongly held assumptions and beliefs:

1.Leadership skills can be developed;
2. A competency-based instructional approach is most appropriate in an adult learning environment;
3.A partnership among University faculty, school practitioners, community leaders, and the learners promotes a more dynamic and relevant learning environment and network of participants (also known as the Community of Scholars);
4. The network established among Community of Scholars members may take the form of large group meetings, small task force and colloquium groups, and small and large group dialogue and meetings via electronic technology;
5. Educational leadership must be grounded upon ethics and moral values;
6. A direct relationship exists between demonstrated competency and future behavior;
7. Cohort grouping provides for cooperative learning and ongoing support systems;
8. The combination of action and reflection best facilitates the integration of theory and practice;
9. An interdisciplinary approach provides the basis for a more comprehensive educational perspective;
10. Analytical skills form the basis for managing change in education;
11. Action research and problem solving are critical skills for effective educational leaders;
12. Instruction is best delivered in a variety of formats;
13. A mentor-apprentice relationship is significant in the development of educational and leadership skills;
14. The nature of adult learners requires the development of innovative scheduling patterns;
15. The need exists for a periodic updating of practicum skills.

Because of our belief in the importance of group process to the leadership of successful organizations, our program is cohort-based. We accept a cohort of approximately thirty students only every three years, so that faculty may provide sufficient support to students in their scholarly endeavors. Each student also has a practitioner mentor over the course of three years of coursework, that person is an executive level educational administrator. This level of support has greatly contributed to the academic success of cohort members. One major indicator of this is the fact that the inaugural cohort that began in 1993, and just passed our seven year statute of limitations, can boast a completion rate of almost 90%, far exceeding the national average for doctoral programs. The second cohort appears to be following in their footsteps with two-thirds of the group completed by only the beginning of their fifth year (inclusive of the three-coursework years.)

The cohort, which consists of currently practicing "middle managers" in education (e.g. principals, education related human service organization managers, university faculty, etc.), attend all courses together in a unique "eight days a semester and two weeks in the summer" schedule. The cohort is further broken down into "advisory groups" of approximately four to six individuals each, each group heterogeneously developed based on results of the Gallup Leadership Perceiver and observation during an initial two-week course. While each student in the program completes individual activities and assignments throughout the coursework, advisory groups also complete projects together. This enables us to discuss and refine group process skills so that they enhance and complement the content skills found in coursework and mentoring.

The coursework in which students engage is based on eight leadership domain areas outlined by the American Association of School Administrators, plus the domain of research skills. The eight domain areas are:

1.Leadership, Values, and Ethics
2.Policy and Governance
3.Instructional Management
4.Planning, Quality, Organizational Problem Solving, and Finance
5.Communications and Human Relations
6.Program Design, Implementation and Evaluation
7. Human Resource Management
8. Leadership and District Culture

Each of those domains is further defined into ten or more specific competencies, all contained on a "Practicum Checklist." This "Practicum Checklist" becomes the basis for the mentoring relationship over a three-year period between student and practicing educational administrator. By developing a portfolio of artifacts, combined with signatory responsibility of the mentor to assure that the student has practical knowledge of each area, we complement the theoretical base for these program areas provided within coursework.

Although it is now difficult to imagine, the first cohort began at a time when even e-mail was not a commonly used technological function. Therefore, while we did assure that even those first cohort members had e-mail accounts with the university, there was no systematic attention given to the technological skills needed by emerging executive level leaders. Therefore, as a new cohort was about to begin, Dr. Helen Sobehart, Director of the Interdisciplinary Doctoral Program for Educational Leaders, and Dr. Larry Tomei, Special Assistant to the Dean for Technology, collaborated on relevant technology for the Leadership Curriculum. Dr. Sobehart was the recently retired superintendent of a large suburban school district known for it's technological capacity. She knew first hand about technological skills necessary to be an effective superintendent. This included knowledge of technical capacity to support both instruction and management functions. Dr. Sobehart and Dr. Tomei reasoned that aspiring superintendents enrolled in the doctoral program would best gain these skills and knowledge by using them in the context of content area coursework throughout the program. Therefore, the first requirement of the program is to participate in a listserv structured for the cohort by which all program announcements and information are shared. More importantly, however, as the program progresses, students learn and apply not only various management packages as they relate to administration, but electronic communication skills, website development, technological planning, and electronic portfolio development. They also, of course, use various research packages and ultimately develop a web-based process for sharing and updating dissertation information with committee members.

The major curricular course goals of the program, and the related technological competencies are listed below. We also list software packages, websites, and other resources by which the technological competencies are met.

Strand: Professional Seminar
- Relevant IDPEL Objectives:
  - The knowledge base which differentiates management functions from leadership with a long-term vision.
  - The ability to understand the function of and develop a relationship with all other human service agencies and organizations that parallel education in society.
  - The commitment to influence the attitude and understanding of all participants in the educational enterprise.
- Tech Objective:
  - The use of basic tools to communicate and conduct research as a community of scholars and leaders.
- Tech Competencies:
  - Office Productivity Tools
  - Internet as a Resource
  - Electronic Mail
  - Web CT, First Class
- Sample Outcome:
  - Everyday use of large and small group listservs and other discussion tools to implement program.

Strand: Leadership and Ethics & Statistics and Problem-Solving
- Relevant IDPEL Objectives:
  - The knowledge of ethical traditions in a multicultural society as they affect leadership in schools.
  - The ability to relate personal and professional values with a functional code of ethical behavior that characterizes all types of populations in a civilized, post-industrial society.
  - The commitment to create an ethical community in the school, community, and beyond.

Tech Objective:
- The use of tools to discuss, survey and quantify issues related to ethical behavior.

Tech Competencies:
- Databases for Research/Surveys
- Scanning Technology
- Listservs as Forums for Ethical Discussions
- Statistics Software

Sample Outcome:
- Design, implementation and analysis of survey regarding ethical behavior

Stand: Society and the Individual

Relevant IDPEL Objectives:
- The knowledge of the cultural, sociological, political, legal, scientific, economic contexts, and educational trends in which districts will operate in the 21st Century.
- The ability to analyze, synthesize, and assess those cultural, sociological, political, legal, scientific, and economic conditions that will impact current and future education decisions.
- The commitment to provide a broad vision of the total community.

Tech Objective:
- The application of various technologies to conduct lessons and research trends.

Tech Competencies:
- Teaching with Technology in the classroom of the future
- Teaching in the 21st century

Sample Outcome:
- Design and presentation of PowerPoint lesson on completed community project.

Strand: Planning, Quality, and Finance

Relevant IDPEL Objectives:
- The knowledge of educational planning process.
- The ability to identify problems and use available data in the planning process.
- The commitment to wed research tools and methods to the solution of actual problems.

Tech Objectives:
- The ability to effectively plan and budget for the use of technology for instruction and management.

Tech Competencies:
- Technology planning for school districts
- Internet as a Research Tool
- Spreadsheets
- Use of Web Home Pages for Districts

Sample Outcome:
- Semester long problem based work with real school district, resulting in community presentation package, incorporated financial analysis, research analysis, research synthesis, addition to/development of district website and/or other integrated tech to support problem solution.

Strand: Managing Environments

Relevant IDPEL Objectives:
- The knowledge of the effects of the school environment on the educational enterprise.
- The ability to use technology in the operation of the physical plant to facilitate a positive teaching and learning environment.
- The commitment to provide a broad vision of the total community.

Tech Objectives:

-The use of technology for decision-making in school environments and to expand the environments in which learning and management take place.

Tech Competencies:

-Administrative software for the school plant
-Technology decision-making: hardware and software
-Policies and procedures for implementing technology
-Distance Learning for lifelong learning

Sample Outcome:

-District technology plan incorporated into facilities plan.

Strand: Program Design & Models of School Evaluation/Human Resource Management

Relevant IDPEL Objectives:

-The knowledge of curriculum design, deliver, and evaluation of instruction and learning outcomes for students and staff.
-The ability to conceptualize and communicate the total educational program to all constituents.
-The commitment to meet the needs of all constituents.

Tech Objectives:

-The ability to use and evaluate electronic systems for assessing student, employee and program progress.

Tech Competencies:

-Electronic Portfolios for Assessment
-Internet Research on district achievement
-Electronic curriculum design and development
-Assessing instructional technology
-Teaching as Intentional Learning

Sample Outcome:

-Development of electronic portfolio for student or Human Resource use.
-Development of web-based dissertation communication process.

Strand: Leading the Dynamic Institution

Relevant IDPEL Objectives:

-The knowledge of the changing society and its effects on the administration of the educational institution.
-The ability to recognize societal changes and to be able to foster institutional change.
-The commitment to promote change in order to foster excellence.

Tech Objective:

-The ability to apply previously guided technological knowledge and skill.

Tech Competencies:

-Practical "Educator in the Workplace" program (technology-supported)

Sample Outcome:

-Establishment of technologically supported international relationship with corresponding colleagues or schools.
-Development of major RFP response for organizational changes/growth in actual organization.

To support the infusion of technology and provide the skills required to master the desired competencies, numerous handouts, web sites, and journal articles are provided. Some of the most important resources will be discussed during our presentation and include:

TECHNOLOGY RESOURCES	RESOURCE LOCATION	TECHNICAL COMPETENCY
Quicksheets for Application Software Packages	http://www2.duq.edu/quicksheets/index.cfm	-Office Productivity Tools -Internet as a Resource -Electronic Mail -Web CT, First Class -Internet as a Research Tool

		-Spreadsheets -Use of Web Home Pages for Districts
Impact of Educational Technology in The Classroom	http://www.duq.edu/~tomei/it_examples	-Teaching in the 21st Century
Learning Theories	http://www.duq.edu/~tomei/ed711psy/1lngtheo.htm	-Teaching with Technology in the classroom of the future
Text, Visual, and Web-Based Resources	http://www.duq.edu/~tomei/	-Electronic curriculum design and development
Management of Instructional Technology	http://webct.cc.duq.edu:8900/SCRIPT/GITED814/scripts/serve_home	-Technology planning for school districts -Administrative software for the school plant -Technology decision-making: hardware and software -Policies and procedures for implementing technology -Internet research on district achievement -Assessing instructional technology
Educator in the Workplace	http://webct.cc.duq.edu:8900/SCRIPT/GELED_595/scripts/serve_home	-Practical "Educator in the Workplace" program (technology-supported)
Electronic Portfolios for Teachers and Administrators	http://www.duq.edu/~tomei/portfolios/portf_1.htm	-Electronic Portfolios for Assessment
Distance Education	http://webct.cc.duq.edu:8900/GITED811/sess5.htm	-Distance Learning for Lifelong Learning

The above statements are only a representation of the major work completed by IDPEL students. For example, the Cohort of 2002 travels to Oxford University in March 2001 to spend a week collaborating with educational leaders from several countries through an International Leadership Conference in which Duquesne's Leadership Institute has been a partner for over a decade. Those collaborations will result in some international publication, but more importantly, ongoing electronic exchange of ideas, curriculum, products, and friendship.

Another example is an RFP response being developed for School Board training related to technology decisions often faced by Boards, and research related to the possible unintended effects of technology on the teaching/learning relationship. The most critical aspect of all, however, is that our students graduate with the vision, knowledge and skills to lead 21st century educational organizations, organizations which are often teaching students who "played with" computers at the same age many of us "played with" Legos. We learned to build real structures, our future leaders must learn to build virtual ones.

Move To The Top Of The Class

A Comprehensive Technology Staff Development Program

Connie Swiderski, Educational Technology Specialist
Educational Technology Division
Education Service Center Region XI
3001 N. Freeway
Fort Worth, TX 76106
Phone (817) 740-7611
FAX (817) 740-3650
E-mail: cswiderski@esc11.net
http://online.esc11.net/educator/

Abstract

Teachers have increasing demands on their time and energy and need a staff development program that offers flexibly and a "just-in-time" approach that provides the skills they need when they need to acquire them. In order to offer this level of staff development, the *Move To The Top of the Class* program will combine 45-minute mini classes delivered during the teacher's conference period in conjunction with just in time, anywhere, any place on-line courses. This paper will look at the mechanics necessary in the delivery of this type of innovative staff development program.

> "There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain of its success than to take the lead in the introduction of a new order of things."
>
> Niccolo Machiavelli

Background

While Birdville ISD has had an on-going staff development program in technology for a number of years, 3 high schools and two middle schools were targeted for intensive staff development this previous year. The program consisted of courses developed to deliver 45-minute mini classes covering a wide range of subjects through out the year. Though the program was considered a success several issues were brought to light in the implementation, management, and participation level. With the continuation and expansion of the technology staff development program for the coming year, now encompassing an additional 26 campuses these issues need to be addressed to improve upon the overall program. The issues are:

- Technology as a whole is too much to learn
- Failure to communicate course information to the faculty and staff
- Lack of faculty input into selection of courses
- Lack of access to the technology being taught in the courses
- Lack of time to enable practice and reinforcement of new skills
- Lack of follow-up support for implementation into the instructional program.

The additional campuses, which are elementary, generate other issues to be addressed:

- Need to switch from Macintosh platform to Windows platform.
- Need to address elementary instructional needs and teaching strategies.
- Need to identify technology appropriate to various grade levels.
- District mandating attendance.

- Implementation of technology standards for all teachers.

Based upon what has been learned from last years program and the new issues that lie ahead, a combination of offering the individual campuses on-campus courses in conjunction with on-line courses was developed.

Goals

Based upon a needs survey conducted by the district and on-going communication with district technology staff, the following goals were established:

- Improve staff productivity and develop positive attitudes in the utilization of technology
- Empower teachers in the use of technology as an effective instructional tool to impact teaching, learning, and student performance
- Provide an innovative, efficient and effective technology staff development program

Objectives

In order to help participants who are likely to be overwhelmed and frustrated by a wholesale approach (Nichols, 1998), the objectives of the *Move to the Top of the Class* program are:

- Educators will have a higher level of participation in technology staff development opportunities.
- Educators will be motivated to participate in extended development opportunities.
- Educators will demonstrate a positive attitude towards the use of technology.
- Educators will develop a sense of community.
- Educators will achieve basic professional competency using technology as a work tool to improve staff efficiency.
- Educators will integrate appropriate technologies into the instructional setting.
- The Program will improve the management system.
- District and program staff will improve communication channels between teachers, administrators, facilitators, and consultants.

Attached is an action plan for each goal (table 1). Outlined in each action are the benefits, responsible person, staff requirements, assessment and timeline.

Program Description

"If technology is to be widely used, teachers and administrators need training. Trying to use technology must be a part of every entry-level teachers preparation and should continue throughout the teachers career so that he or she can keep abreast of developing technologies" (National Governors' association. 1991).

In it's second year of implementation *Move to the Top Of The Class*, a series of on-campus and on-line courses, is designed to prepare teachers to integrate both the Internet and classroom computer applications into daily lessons. The series of courses will teach technology skills to teachers through the same project-based learning activities they use in their own classrooms. As teachers progress through the courses, they will develop technological skills and -- more importantly -- strategies and materials they can put to immediate use in their classrooms. The emphasis is on supporting classroom instruction.

Teachers are frustrated because learning computer skills requires the ability to absorb so many different concepts and also requires a great deal of time to practice and experiment before they feel confident enough to involve their students (Fisher, 1998). This program allows the participant to absorb small amounts of information at a time and all the time they need to practice and review through on-line involvement.

Method Of Distribution

Two methods will be used for the implementation of this staff development program. All participants will have the option to work through various *Move to the Top Of The Class* courses at a scheduled class time with an instructor in their school's computer lab using the *On-campus Method.* Educators will have the additional option of participation using the *On-line Method.* Using this method they access the Internet in basically the same course.

On-campus Method

On-campus courses will be instructor lead and offered the top of every conference period at the campus for approximately 45-minutes in length. Participants are invited to attend as applicable during their conference periods. The skills taught for that course will use project based "student centered" activities. Each course will have templates available for direct use in the classroom.

On-line Method

Broadly defined, distance learning offers a delivery mode in which the physical classroom, the instructor, and the students are not all present in the same time and location. Distance learning delivery systems can be categorized as those that help eliminate barriers posed by location, those that help eliminate barriers of timing and those that help eliminate both spatial and temporal barriers simultaneously (Levenburg, 1998).

Move to the Top of The Class on-line courses deliver instruction through the Internet and offer interactivity, personalization, and the flexibility to learn anywhere you can access the Internet. The participants can learn at the learner's own pace and are not required to attend scheduled on-campus courses while still obtaining district credit. Thus, the on-line course provides "education on demand" giving the participant flexibility that allows them to fit course work among other demands on their time. Also, it allows the participant an opportunity to preview the courses, to ascertain the content of the course, and to check the level of prior knowledge needed for the course for the purpose of assessing the worthiness of the participant's time and attendance of an on-campus course thus freeing the participant to attend or participant in other courses.

Additionally students interact with one another and with the instructor in the discussion board. Along with discussions there are other on-line activities designed especially for the course. Other various on-line program features are electronic mail, on-line resources, and course materials.

How to participate, how to access the courses, what to expect, and how to find help are all important aspects of an on-line course that must be addressed. There is a guided tour of the on-line courses along with on-campus instruction lead, if you choose face-to-face interaction to familiarize yourself with the on-line courses. The orientation tour on-line or on-campus will cover the discussion board and the use of email from the on-line site also. There is a FAQ link to help with questions you might have along with phone numbers and e-mail addresses of the Program Administrators.

The design of the on-line course site is hierarchical in nature and therefore an easy structure to follow. Each course has all materials pertaining to it inside the folder for that course. All available templates and such are available to the on-line participant just the same as the on-campus participant.

Methods of Interaction

The On-campus Method allows educators to interact with other campus members where relationships are already formed therefore interaction is easy to achieve. Educators in this environment have common background and bond.

The On-line Method has participants from anywhere in the district participating therefore many methods are used to build a sense of community. It is important to create the comfort level for learners that will encourage them to contribute, explore, and communicate with people that they may never see in a face-to-face situation (Lassiter 1998). Discussion boards give that opportunity for participants to interact. Couple a *Move to the Top Of The Class* course with a moderated on-line discussion group and a powerful staff development tool is created.

In the On-line Method, participants can complete specific activities, post projects for others to view, or use the discussion group for follow-up discussion from an on-campus course. Participants involved can build a collaborative community through a discussion board to which instructor and participants will post messages. Discussions may include: topic of the course, sharing information found on the Web, strategizing with peers about the best way to implement a lesson in the classroom, or responding to a problem or issue posted by peers or the instructor.

Getting to know someone across a table requires social interaction skills that teachers are usually well skilled at, but across a telephone wire? A useful technique for on-line courses is to have participants introduce themselves to the group, share their experiences, tell what each hopes to gain by participating, and describe that knowledge or skills they can contribute to the group learning process (Lassiter 1998). Also, using the added resources links page participants can explore other forms of communicating with one another with programs like ICQ, Paltalk, and Net-meeting.

Methods Of Instruction

The On-campus Method will tend to be more lectures formatted with the constraint of the 45-minute time frame to work within. The "sage on the stage" instructional mode will be predominantly used to convey the skills for the course.

The On-line Method requires individual study and one-on-one interaction with the course instructor and on-line contact with other participants. When designing Web-based educational programs for adults, it is important to create an on-line environment that is conducive to learning, and one that encourages and support the self-directed learner. (Lassiter 1998) The instructional process is designed to be both highly interactive and personal. The on-line instructors will provide information, facilitate participant's activities, and identify resources. Since participants communicate one-on-one with the instructor, the instructor to some extent serves as their tutors, a much more intimate process that is not often experienced in classroom instruction. Thus, the role of the instructor in the on-line courses will be that of the tutor-facilitator, rather than one of lecturer.

Methods Of Evaluation

Several methods of evaluation will be used for each course independently. An evaluation of the time on task and the participant's presence at the course will be recorded by logging-on to Educator, the on-line system program. All courses will use the assessment log included in Educator for the evaluation of time on task and the participant's presence. The time factor of 45-minutes scheduled for an on-campus course is automatically attributed to the participant for all on-campus courses. On-line participants will be evaluated for time on task by the use of the access logs in Educator, but times will vary based on the levels of participation.

An evaluation survey will be as used as an assessment at the completion of each on-campus and on-line course. The evaluation survey allows the participant to assess their understanding of the philosophy presented, content presented, participation in course, and an overall assessment of the course. Certificates will be issued directly to the participant present at the on-campus course. On-line participants will be issued, per on-line course, certificates based on their on-line assessment log of equal or greater times on task of 45-minutes. These certificates will be delivered to their respective campus consultant for distribution to the participant. Using the access logs, totals will be kept of all participants time on task for all courses on-campus and/or on-line attendance and certificates will be issued to the *Move To The Top Of The Class* teachers with the highest totals for each campus.

Implementation

Implementation of this program will begin with a presentation about the program to campus principles at their monthly meeting. Having administrative buy in to the program is essential to the success of any good staff development program. Logistical concerns will be addressed such as the scheduled on-campus course dates; staff surveys forms for input into the decision process, campus logistical information for consultants, and the designated site facilitator for each campus. The instructor often finds it beneficial to rely on a site facilitator to act as a bridge between the students and the instructor (Willis, 1995). Choice of courses and their descriptions will be provided to the principals along with a survey results form to convey their campus's selections. In addition to the principal, the campus staff must be addressed. A positive introduction to the faculty is also essential to the overall success.

Each consultant will be assigned a campus and given the dates and subject for the on-campus courses. Simultaneously on-line courses will be aligned to the appropriate ESC Educational Technology Specialist for the facilitation of that course. The program will be publicized including all key elements such as delivery methods; methods of interaction; instructional modes; evaluation methods; along with courses and dates by the district, site facilitator, and campus administrator to all district employees. A variety of formats will be used to publicize the program (Table 1).

Conclusion

Although critics argue that schools are rushing to jump on the latest education bandwagon, it appears evident that educational environments cannot survive without implementing electronic media and instructional technologies. Indeed, today's schools are in a period of transformation (Fisher, 1998). Technology is the tool that is changing the world of teaching and learning. This transformation is being reflected by the Education Service Center Region XI in cooperation with Birdville ISD by providing for district teachers through the *Move To The Top Of The Class* staff development program not only ways to build the knowledge and skills needed to be proficient in the use of technology, to use technology in curriculum planning, and designing student learning activities that integrate technology, to engage students in "student centered" learning experiences, and to communicate and collaborate to promote the use of technology to improve teaching and learning but delivering this training in smart ways to allow the participant flexibility to fit course work among other demands of their time. Support for this transformation is offered in the forms of face-to-face on-campus courses with a consultant for each campus, and on-line versions of the on-campus courses and an on-line instructor for each course. With the support of the administration to encourage teachers to participate in the on-campus and/or on-line courses the hope is to offer non-threatening training and support for all participants.

References

-On-line:

Levenburg, Nancy M., and Major, Howard T. (1998). *Distance Learning: Implications For Higher Education In The 21st Century.* Available: http://horizon.unc.edu/TS/commentary/1998-11.asp.

Willis, Barry, and Engineering Outreach College of Engineering University Of Idaho. (1995) *Guide #1 Distance Education: An Overview.* [On-line]. Available: http://www.uidaho.edu/evo/dist1.html.

-Proceedings references:

Lasseter, Marie, and Flanagan, Juanita. (1998). *Engaging Adult Learners On-line: Strategies For The Development Of A Web-Based Professional Development Program In The University System Of Georgia.* WebNet1998.

Nichols, Paula. (1998). *Stumbling Blocks and Stepping-Stones: Keys to Successful Video Conferencing Networks.* WebNet1998.

Fisher, Susan C., and Dove, Marianne K. (1998). *Muffled Voices: Teachers' Concerns Regarding Technological Change.* WebNet1998.

The Information Revolution and The Future Role of Educators

Michael Szabo, Ph.D.
Professor of Educational Psychology and Technology
DIRECTOR, TIES Project
University of Alberta
Edmonton, Canada
Mike.Szabo@ualberta.ca
http://www.quasar.ualberta.ca/DRMIKE

Abstract: The purpose of this paper is to identify trends which are likely to come to fruition in the near term future and generate implications for the educational professional. The trends focus upon the information communications revolution and one subset, the coming Instructional Technology (IT) revolution. Ideas have been abstracted from the author's forthcoming chapter in the *International Handbook on Information Systems*. (In Press). H. Adelsberger, Collis, B., & Pawlowski, J. (Eds.). Berlin: Springer-Verlag.

Introduction

Humanity has passed through several major eras, based on technological advances, which have changed society dramatically. Examples include changing from 1) hunter to agrarian, 2) quill pen to printing, 3) agrarian to industrial, 4) manual to electrical, and 5) bits to digits (the digital revolution). The latter is also called the information technology communications (ICT) revolution and we are currently engaged and embroiled in its infancy. The four main waves of innovation since the 18th century include the Industrial revolution in Great Britain, fueled by steam power from 1780s to 1840s (and took 100 years), railway age from 1840s to 1890s, electric power and automobile from 1890s to 1950s, and the information age (1950s--).

After each of these major social revolutions became fully diffused into society, periods of relative calm, peace and stability ensued, interrupted by the occasional war. During each of these transitions to the new order of things, however, there was major chaos, upheaval, and uncertainty. For example, the transition to the age of electricity witnessed the major dislocation of slaves in the United States as the spread of rural electrification made them too expensive to maintain. The industrial revolution witnessed one of the greatest mass migrations in history as people left rural areas to form burgeoning urban areas which led to the growth of social support systems.

We are currently embroiled in the next major revolution, stimulated by the microcomputer and attendant digitization. This has been referred to as the Information Communications Technology (ICT) revolution. This revolution is resulting in significant changes in the way people and organizations communicate and function. It is radically changing, in both qualitative and quantitative ways, how we carry out our day to day activities.

One might ask, what does the future hold for educators with respect to the Instructional Technology (IT) revolution which is rapidly sweeping across the globe? Predicting the future beyond lunch is a risky business filled with uncertainty. There are simply too many twists and turns ahead in the road. Some have opted for developing vision of what the future should be like, rather than to predict it. Alan Kay, now Disney fellow once remarked that the best way to predict the future is to invent it. Another alternative (to ignoring the future and dealing with it as it comes) is to identify possible major events, how they might unfold, and prepare for them all. This is called the scenario approach.

The Scenario Approach

The first scenario, at one extreme, is that nothing will change significantly from the current state of affairs. A teacher from the early 1900s who was magically transported to a current classroom would feel quite at home. The appropriate strategy might be to maintain a low profile in the trenches, keep your helmet pressed down around your ears and keep your head low. It is regularly practiced by many who are either within a few years of retirement or view their role as stewards of the institution who will turn it over to their successors in the same fine shape they received it. Some have suggested the lack of wisdom of this approach.

> Universities won't survive...higher education is in deep crisis. Already we are beginning to deliver more lectures and classes off-campus via satellite or two-way video at a fraction of the cost [of traditional courses]. Today's [campus] buildings are hopelessly unsuited and totally unneeded. (Drucker, quoted in Green, 1999, p 15).

In a series of studies of campus computing in the USA, Green paints a somewhat dismal picture of the preparedness for this change when he says "the evidence suggests that as an "enterprise," higher education remains mostly unprepared for the consequences of this coming convergence." (1999, p. 11).

The other extreme end of the scenario spectrum is that the ICT revolution will dramatically effect how instruction is delivered in a major and revolutionary fashion. A teacher of today, transported into this new future, would be bewildered, out of place, and find difficulty determining what to do or say. The viability of this scenario of the future of education is based on machine and intellectual technologies which have been promised and are being tested at this time, plus successful experiences on smaller or non-educational scales than proposed in the following scenario.

Below are some guidelines to prepare educators for the IT society based on a review of current and projected technological and sociological developments.

Specialize in Change and Reform

If IT is not "rocket science" and can be implemented by any educator with proper support, particularly that which is provided in the context of the interdisciplinary team (see below), why has it been so little used? One answer whose credibility is growing is that IT represents a major innovation and the diffusion of innovation involves change. Bates has argued that

> New technologies are associated with postindustrial forms of organization based on highly skilled and flexible workers with a good degree of autonomy organized into relatively small and flexible operational units. In contrast, universities and colleges have been characterized by a mixture of agrarian and industrial forms of organization, with hierarchical, bureaucratic, and relatively inflexible organizational structures and procedures...the introduction of new technologies for teaching will require a major shift toward postindustrial forms of organization for universities and colleges." (Bates, 2000, pp. 1, 2).

It behooves us to learn all we can about the process of diffusion of innovation (change), whether it comes from a managerial, administrative higher education framework (e.g., Bates, 2000), a business leadership framework (Kotter, 1996; Senge, 1990), a sociological, psychological framework (Rogers, 1995), or an educational technology framework (Fullan, 1991, 1992, Szabo et al, 1999). This leads directly to the second role.

Understand Innovation Rules and How They Apply to IT

IT must be respected as an innovation and its diffusion (Rogers, 1995; Szabo, 1996; Szabo & Anderson, 1997; Szabo, Anderson & Fuchs, 1999). This approach begins with an examination of those factors which characterize successful and unsuccessful innovation diffusion, from a variety of fields of human endeavor. It then constructs a system to optimize the effects of those factors. This paper looks at twelve characteristics of innovation and implications for the IT educator.

1. Innovation is warmly accepted as an abstract concept but rejected as an operational outcome (the rational behavior of individuals and institutions is to promote stability and resist change). As one vice-chancellor observed "I don't have time for cultural change." (Bates, 2000).
2. The vast majority of innovations fail—they never become widely adopted.
3. Most innovations aren't—they are merely tinkering with the system. "Schools and colleges are as productive and innovative as were Soviet collective farms." (Dator, 1993).

4. Innovations which become successfully diffused often have changed significantly to the point where they are barely recognizable. The telephone arose from an effort to help hearing impaired, etc. This underscores the importance of local control and empowerment to enable people to adapt the innovation to their particular requirements, along with the 'global brain' structure to disseminate the adaptations.
5. Historically diffusion of innovation has taken significantly longer to happen that we remember or hope for. It doesn't fit neatly into the five year appointment cycle of administrators or term of politicians. An example from machine technology is the mouse, which was developed in 1964 but did was not diffused into the computing scene until the introduction of Apple's Macintosh, 20 years later. For more on the man who developed the mouse, look at the Stanford Review of [Doug] Englebart's work at http://unrev.stanford.edu.
6. When will diffusion of innovation, particularly of IT, happen? Precision predicting is not possible. However, an estimate can be made, based on the time between the invention or development of some innovative idea and its widespread diffusion. This 'incubation time' has been pegged at roughly 20 years for high tech innovations (e.g., the mouse was introduced in 1964 and set the standard in 1984 with Apple's Macintosh) and educational innovations have larger incubation times. For the sake of argument, I'll choose 50 years for the latter. If we agree that instructional technology is a blend of a high tech and an educational innovation, we might conclude that the incubation time will be longer than 20 years but less than 50. When do we start marking time? Let's take the 1960s, the beginning of the early computer assisted instruction programs developed for digital computers. This yields a likely range of incubation time from 1980 to 2010 and puts us, at the time of this writing, well within the expected period of mass diffusion.
7. The innovator is a dedicated keeper of the dream with total focus. The commitment to bring the innovation to life the ability to inspire and motivate others is characteristic of all successful innovations. Due to the vision-driven nature of innovation, since no one has gone there before, innovation must be guided by a strong, concrete and shared (Senge, 1996) vision.
8. There is a school of thought that innovation can't be managed-it must be led (Kotter, 1996). The main tool in the hands of administrators is policy-formation and it works well in running an institution. However, there is almost no evidence that innovations arise because of administrative policy and it can be argued that administrative policies may be out of step with innovation and inhibit the creativity needed to innovate. As noted futurist Paul Saffo (1997) observed

   > "we are all preoccupied with trying to get standards established, and that's a good thing. But few people realize that once standards are established they stay around for vastly longer than we would wish and are used for purposes we never intended. And that's where vertigo comes in because if people realized the consequence of the standards karma they would be completely immobilized."

9. One view of innovation is that is simply the testing of many good ideas and discarding those which don't work. This means successful innovation is characterized by a great deal of trial and error and discarding failures; however, this activity is easily labeled failure. The majority of institutions and individuals do not tolerate failure and people who are supervised by them tend to be risk-aversive.
10. Innovation as an end has limited value: innovation as a means to an end have tremendous value. The value of IT will come not from itself, per se, but from the extent to which it can help educators 1) do what they normally do to improve learning (e.g., providing quick and detailed performance feedback) and 2) step up to new opportunities and applications previously not addressed (e.g., increasing access to specific learning by specific individuals in specific locations).
11. Related to the previous point, people and institutions pass through three identifiable stages which they encounter an innovation—play, use, create (PUC). The play stage is learning about the innovation—what it can and can't do, how to access and use it, how to trouble shoot. If learning is successful, the use stage begins in which the innovation is employed to help people accomplish task they already do, such as word processing for handouts, assignments and test items, spreadsheets for accounts and student marks. Only when a certain comfort/competence level is reached does the individual and institution begin to use the innovation to help do those things that couldn't be done, or even imagined earlier. For example the use of IT to provide access to education, training and information in a distributed learning environment (sometimes referred to as any time, anywhere, or just-in-time education). "...teachers, even those most enthusiastic about teaching with technology, typically pass

through several distinct stages before they become educational technology integrators and innovators." (CEO Forum, 1999, p. 13). Corporate researchers have also identified a similar cycle of technological innovation. It has happened that an innovation's value was not appreciated because it was in the first stage, for example, the suggestion that a powerful use of the microcomputer would be as a storage and retrieval device for recipes in the kitchen of a home.

12. A critical mass of users, 50% by one estimate, is a common hallmark of success of an innovation. Since the IT culture cuts across all subjects, grade levels and barriers of time and geography, every educator is a potential user. One quickly concludes that, using conventional methods, there are not enough trainers or time to provide all the basic training needs, let alone address the on-going requirements of support, upgrades and so forth. To simply provide the necessary training to this large audience requires new initiatives and new solutions.

Focus on the Intellectual Technology, as Well as the Machine Technology

It is often stated that IT is too expensive. Exploring this notion further results in the conclusion that in education, machine technology costs are quantifiable and add-on, while the supposed benefits (increased achievement, effectiveness, attitude and access) are neither 1) easily quantified nor 2) valued in a practical, applied sense in education (which faculty member's increments or other rewards are based on how much their students achieve or how quickly)?

While it may be true that it is a zero-sum game for machine technology (money spent on IT must come from some other part of the budget), the intellectual technology represented in the employees of the university or college is a rich, renewable and expandable resource. And it is this technology which creates the programs which drive the learning process which is presented by the machine technology.

Predict Directions Computing is Going and the Implications for Education

Networking

The global network of interconnected servers and clients will enable every educator (and student) to not only obtain resources from any location in the world, it will also enable every educator to contribute resources where they have expertise.

Broadband Transmission

The first infrastructure technology element is broadband communication which will enable the transmission of interactive and multimedia computer files significantly larger than anything we have today outside the research laboratory. At the time of this writing, governments are selling expensive licenses (average cost in Britain of $7B per license; Wilhelm, 2000) for third generation (3G) broadband frequencies which will significantly increase the ability to transmit large (e.g., full motion, full color video) files using wireless technology.

Wireless Communication

Wireless communication will permit full access to all educational services we now have and more, from any place in the world without a physical connection. On the day everyone has a single access number and full multimedia capability on a portable wireless device, we will have to rethink how, when and why we communicate with students, colleagues, administrators, suppliers, and experts.

Internet Appliances

"Internet appliances are part of a new wave in consumer electronics that is fusing elements of wireless phones, audio-visual entertainment devices and traditional PCs into gadgets that are more portable, accessible and fun" (Burns & Bickers, 2000, p. 30). One such device resembles a 20 by 29 cm notepad with a digital screen, pencil-like pointing device and wireless connectivity. This prototype hand-held device and presumably its successors (1) are made possible by microchips with high power but low power consumption, (2) will enable complete, interactive, multimedia-based courses of instruction to be received anywhere, and (3) will become relatively inexpensive if the forecast high volume consumer demand drives down prices.

One implication is that the costs of distance education compared with conventional learning will become exceedingly attractive, especially when one considers the tradeoffs of the time and inconvenience and lost opportunity costs of relocating to an institution of higher education.

Databases

The next technology is exemplified by the VISA credit card phenomenon which operates with vast interconnected server-driven databases which collect, store, quickly analyze and regurgitate on demand, information requested by authorized users, clients, and administrators in report format which they specify and control. Imagine the existence of master, world wide educational databases which contain detailed information about every conceivable aspect of educational life everywhere on the globe. Educators will have to create, maintain, and use these databases for the benefit of their students, profession and livelihood.

New Models of Operation Infrastructure

The final infrastructure component is a function of the human rather than technological concepts. This involves a major reconstruction of the educational systems of the world. Indeed it will require a major cultural change (Bates, 2000, Szabo, 1996).

> The advent of the Internet is a massive, even unprecedented exercise in managing change…Success requires changing the model for how to organise the work and lead the organisation. It requires challenging traditional assumptions about organization, communication, decision-making, operating style, managerial behavior -- and then defining a new way. *That is a human problem, not a technological one.*" [emphasis added].

CMC may result in a major leap forward in the development of the global brain. It certainly seems to be playing a role in the development of the operating system called Linux. Anyone can change the code to improve or extend its functionality, but the changes must be made available to other users. Theories of learning which place high value on knowledge construction through dialogue with others and reflection may benefit from enhanced CMC in the forms of computer conferencing, e-mail, list servs an other facilities which have yet to be developed.

Preserve Conditions of Intellectual Freedom and Open Political Institutions

The Post Industrial Society and its current incarnation, informationalism, promise men and women greater control of their social destinies. "But this is only possible under conditions of intellectual freedom and open political institutions, the freedom to pursue truth against those who wish to restrict it. This is the alpha and omega of the alphabet of knowledge." (Bell, 1999, lxxxiv). But this requires action based upon reflective thinking. "In times of rapid technological change, reflective practice is virtually an occupational necessity for everyone (Guiton, 1999, p. 52).

Respond to Changes in Educational and Social Goals

We are already witnessing increased demand for intellectual education and training for service, professional and managerial employment, coupled with decreased but nevertheless existing demands for skilled and semi-skilled workers. These latter will be reduced by such technologies as performance support systems and expert systems, which in turn will require building. There will also be a growing need to retrain and re-orient workers displaced by informationalism and provide entry into the market.

Another area of concern to educators is a somewhat uncomfortable concept--market share and competition with other educational institutions, commercial firms, and international alliances. Does your institution want a market share of the education and training industry, and if so how much? In the early days of the Internet, it will be easy for institutions to capture a nice share of the student market, but there are signs that will change as competition heats up.

Develop and Use Technology to Communicate

The capacity and speed of communications networks has increased massively. In 1970 it would have cost $187 to transmit the Encyclopedia Britannica as an electronic data file across the US. Today, the entire contents of the Library of Congress can be sent across America for $40.

The benefit of being online increases exponentially with the number of connections, which increase as communications costs plunge. Robert Metcalfe's Law states that the value of a network grows with the square of the number of users. (Economist, 2000). The birth of the internet started in 1990 and the browser in 1993. The number of users worldwide has already climbed to more than 350 M and may reach 1B in 4 years. Seven million pages are being added to the internet daily.

Computers aren't just for number-crunching anymore. They have become powerful but limited tools to support a wide range of communications. Consider the role of reflection and expertise among members of a class and how those elements can be used to enhance and enrich the educational experience of the whole class. Consider also access to scholars and the latest updated information on everything in the world you want to investigate.

Break Free from Conventional Bonds and Thinking

The term horseless carriage was used to define the first automobiles-a blend of the old and new. But retaining the old, while providing some level of comfort, may have hindered the appearance of the new. The view of the early airplane as a vehicle to transport individuals over short distances likely hindered the development of mass travel which we currently enjoy. Perhaps the term distance education will conjure up images of the classroom in different regions, led by a teacher, and have a stifling effect on the culture change necessary.

One way to break from conventional bonds is the look at things from a different perspective. It has been said that a chicken can be defined as a device which an egg uses to reproduce itself.

There are myriad details of how this could or should take shape; too many to include here. An extensive review of immersive instruction through virtual reality technology may be found in McLellan (1996). The outcome, however, is that any student can access the best education in the world from any location in the world in any time zone. The global brain will be strengthened. Now if we could just make similar progress and expand results like these into the arena of ethics, morals, and the realm of spirituality.

Change is guaranteed but what that future will look like must wait until it happens. It is likely however that change will continue at a rapid, even accelerating pace. Several other conjectures come to mind. First, unlike most of the rest of our economic, social and cultural environment, education has to date been largely untouched by the sweeping changes arising from the ICT revolution. It seems likely that this will change; that ICT will ultimately have a transforming effect upon the way we conceive of and deliver educational services.

References

Bates, A. W. (2000). *Managing technological change: Strategies for college and university leaders.* San Francisco: Jossey-Bass.

Bell, Daniel. (1999). *The coming of post-industrial society.* NY, NY: Basic Books.

Burns, S., & Bickers, C. (2000, June 29). Innovation: Microprocessors: Moving target. *Far Eastern Economic Review*, 163, 30-32.

CEO Forum on Education and Technology. (1999). *Professional development: A link to better learning (School technology and readiness report - Year two).* [On-Line]. Available: http://www.ceoforum.org/downloads/99report.pdf

Dator, J. (1993, June). *The college classroom of the year 2010.* A Seminar for Presidents of Community and Junior Colleges from Japan and the United States. University of Hawaii.

Economist, (23 September 2000) *Technological Innovation Diffusion* vol 356.

Fullan, M. G. (1991). *The new meaning of educational change.* (2nd ed.) . New York: Teachers College Press.

Fullan, M. G. (1992). *Successful school improvement.* Buckingham: Open University Press.

Guiton, P. (1999). Professional reflective practice and lifelong learning. In K. Harry, ed., *Higher education through open and distance education.* London, Routledge.

Green, K., C. (1999). When wishes come true: Colleges and the convergence of access, lifelong learning, and technology. *Change, 31,* 10-15.

Kotter, J. (1996). *Leading change.* Boston, MA: Harvard Business School Press.

McLellan, H. (1996). Virtual realities. In Jonassen, D. (Ed.). *Handbook of Research in Educational Technology.* New York: Macmillan.

Rogers, E.M. (1995). *Diffusion of innovations* (4th ed.). New York: The Free Press.

Saffo, P. (1997). [Interviewed by R. Adler]. Available at
http://palm.fgreen.com/infoworld/interviews/saffo.html#GETTING OUT OF THE BOX

Senge, P. M,. (1990). *The fifth discipline: The art and practice of the learning organization.* NY, NY: Currency Doubleday.

Szabo, M. (1996). Change in the use of alternative delivery systems through professional development within colleges and universities. In *Educational Multimedia & Hypermedia.* Carlson, P., & Makedon, F. (eds.). Charlottesville, VA: Association for the Advancement of Computing in Education. 655-660.

Szabo, M., & Anderson, T. A., (1997, December). *A reconceptualization of the problem of instructional technology in post secondary education.* Paper presented at the annual meeting of the International Conference on Computers in Education. Kuching, Malaysia.

Szabo, M., Anderson, T., & Fuchs, A. (1999 June). *Report on a change system: The Training, Infrastructure and Empowerment System (TIES).* Paper presented at the annual convention of the World Conference on Multimedia and Hypermedia, Seattle, WA.

Wilhelm, K. (2000, June 29). Innovation: Telecoms: Trial of strength. *Far Eastern Economic Review,* 163, 34-35.

WANTED: A MIRACLE WORKER - a Consideration of Some Issues Arising From the Leadership of Entrepreneurial Activity in Information and Communications Technology in an Academic Setting.

Lynne Walker
Associate Dean, Faculty of Education, University of the West of England, UK

Abstract This paper seeks to explore notions of leadership in relation to the role of the Project Director of a nation-wide in-service ICT training and development for teachers provided by a University Faculty of Education. In examining leadership and the management of change the paper seeks to focus upon the dilemmas inherent in managers leading entrepreneurial activity in an academic environment. The paper also attempts to highlight some lessons learned, key issues requiring resolution and future papers to be written.

Wanted: a miracle worker who can do more with less, pacify rival groups, endure chronic second-guessing, tolerate low levels of support (if not outright opposition), process very large volumes of paper and work excessively long hours. He or she will have carte blanche to innovate, but cannot spend much money, directly hire personnel, or upset any constituency. Internal processes will frustrate a rapidly evolving project and the need to make key decisions in a split second. External quality assurance agencies will never leave you alone. Honourable failure is expected, success will be hard to believe. (after Evans 1992). Welcome to the surreal world of entrepreneurial activity within a university faculty of education in the UK.

Traditional revenue sources for universities in the UK are under downward pressure with year on year "efficiency gains". The nature of work within higher education is undergoing enormous and rapid change in the UK, and with little precedent to guide us, we academic managers are reinventing our professional role as we go. The cause stems from the new environment we are facing wherein competitive pressures are forcing universities to adopt new strategies, familiar to business and industry - mergers and acquisitions, reductions in staff, performance-based rewards - but heretofore almost completely unknown in education. Communities of scholars are becoming independent budgetary units. Government policy, student and community demands, corporate interests and technology have all stormed the walls of the university and we find ourselves in a classic double bind. Entrepreneurial activity is expected, indeed it is essential to survival, but our internal systems are not geared to it, nor is our culture - risk taking is increasingly necessary but creates suspicion and conflict in regard to the real role of university, intellectual and educational leadership.

Leading entrepreneurial activity in an academic setting is, for me at least, as much about managing change as it is about providing a service and making money. Many people make the mistake of assuming that change is a rational activity, undertaken by rational people. As I see it, the real challenge for both managers and managed is that most change is power coercive, forced upon us by external agents and agencies and it is that which produces antagonism and stress and an aversion to change.

Successful management of change requires certain qualities of what is most often referred to as leadership, as well as the ability to deal or negotiate successfully with vested interests and/or significant individuals. The status of an individual change agent is crucial, notions of credibility and the status of knowledge all play their part in ensuring success or failure of change, as indeed does communication.

For me there is an additional problematic issue in that leadership traditionally has been studied using male norms as the standard for behaviours. There is a whole edifice of conventional gendered expectations of management, with which to contend. Women managers are especially vulnerable to criticism when such stereotypical expectations are not met, Woman as leader requires a competent self, creative aggression and the ability to get things done that make life better (Cantor and Bernay 1992). In my view the leadership vision needs to consist of pointing to the more distant mountains and engaging as many as possible in a collaborative process of action, enquiry, reflection and improvement on the journey. A consequence of this might be that the peaks climbed may turn out to be different to the original first intentions. But ownership of change is a pre-requisite to successful innovation, there must at least be enthusiasm for the proposals. Leadership is creating a state of mind in others

Some lessons learned, issues to resolve and academic papers to be written

* There is no definitive answer out there about how to engage in entrepreneurial activity linked to the e-learning revolution. It is of course possible to gain insights, ideas and inspiration but the road to "success" is an extremely complex one and is due in great part to the cultural conditions of the institution in which one operates.

* Dealing with resistance can be very stressful. People attack you and your precious ideas and seem to show no respect for you. Ignore the temptation to get even with them, even though you know they need the money you are earning in order to keep their jobs.

* Be hopeful, certain that something makes sense regardless of how it turns out, hope is the strength to continually try.

* We need to engage in a structured dialogue about how emerging technologies can be employed to enhance the reputation of the university and the student experience.

* Universities are not businesses in the ordinary understanding of that word.

* Really important issues of public policy v economic perspective go against university culture.

* The development of technology-reliant training and education worthy of our reputation as the university with the seventh highest teaching quality ratings in UK is costly and risky, especially when the management and organisational infrastructure required for making such investment and development decisions are not well developed.

* Many of the possibilities created by new approaches to delivering e-education are not natural extensions of the traditional relationship that exists between academic staff, their academic homes and their publishers.

* The impact of technology, especially the internet, upon leadership behaviour will be profound. Can anyone lead by email?

* What counts as success? The nature of work in ICT, particularly courseware development, emphasises the value of productivity and aesthetics and when we analyse the process of production it can be seen that these often displace educational criteria. How can we ensure that education, in particular student learning, is of paramount importance - I believe this to be a research priority.

* The main determinant of success for our clients (teachers) has been the quality of the content, and in particular the pedagogical focus of it, and not the technology. This has in turn presented us with a niche market opportunity!

*There is an urgent need for most UK universities to decide what form their engagement in e-learning will take. The resultant ability or lack of it to assimilate change will influence the capacity to reconcile the mission, values and ideals of the academic community needs with an awareness that the student or "consumer" of the future is likely be an educational "channel surfer".

* The impact of ICT creates new roles and power structures, the title "Web Master" is but one example of a job title that highlights a range of complex gender-related issues that would benefit from further exploration.

* If as Kouzes (2000) believes "Collaboration will be the critical business competency in the Internet Age", then academic communities are in a strong position.

* The application of free market ideology to higher education does come at a price - the undermining of the purpose of universities is part of it.

…I also learned what makes a web page sticky!

References

Bates, A.W. (2000). Managing Technological Change, San Francisco, Jossey-Bass.
Bennis, W. (2000). Managing the Dream: Reflections on Leadership and Change, New York, Perseus Books.
Burbules, C. (2000). Globalization and Education: Critical Perspectives, New York, Routledge,
Cantor, D, Bernay, T. (1992). Women in Power, Boston, Houghton Mifflin.
Evans, R. (1995). Getting Real about Leadership, Education Week 14, (29), 36.
Fullan, M. (1998). Breaking the Bonds of Dependency in Educational Leadership, Educational Leadership, 4.
Katz, R. (1999). Dancing with the Devil: Information technology and the New Competition in Higher Education, San Francisco, Jossey-Bass.
Kotter, J. (1999). What Leaders Really Do, Boston, Harvard Business School Press.
Kouzes, J. (2000). Link Me to Your Leader, Business2.com issue 10/10/00
Ozga, J and Walker, L. (1999)."In the Company of Men" in Whitehead, S and Moodley, R. (eds) Transforming Managers: Gendering Change in the Public Sector, London, UCL Press.

Emerging Careers in Instructional Technology

Dr. Shirley Waterhouse
Director, Educational Technology Department
Embry-Riddle Aeronautical University
Shirley@db.erau.edu
http://edtech.erau.edu/Shirley

Abstract: The implementation of instructional technologies is creating a number of new careers in education. Three are instructional technology director, instructional technologist, and instructional technology technician. Also, numerous positions are required when institutions develop instructional technology modules in-house. This paper provides a brief overview of the major instructional technology positions, as well as a description of a faculty technology liaison and the details of an instructional technology director job description.

Overview - Instructional Technology Careers

Instructional Technology Director. The director and his or her assistants will supervise and direct all aspects of the instructional technology team. The director's major responsibilities include facilitating or overseeing institutional instructional technology planning and instructional technology implementation, recommending an instructional technology infrastructure, establishing faculty technology development programs, initiating instructional technology prototypes, recommending standards and policies, and facilitating instructional technology assessment. Harris and Waterhouse provide an example job description for an instructional technology director in Figure 1. (2001)

Instructional Technologist. The instructional technologist assists faculty with the integration of instructional technology to enhance teaching and learning. Instructional technologists might also be responsible for assisting faculty in the development of technology enhancements, which would entail a variety of responsibilities. Assisting faculty with development would most likely include the multiple roles of trainer, instructional designer, graphics artist, Web developer, and project manager. An instructional technologist's major responsibilities include faculty technology development, recommendations on infrastructure upgrades, consultations with faculty on Web-based instructional design and pedagogical issues, as well as the facilitation, evaluation, and reporting on technology prototype initiatives, and other duties as applicable.

Technical Specialist. The instructional technology technical specialist is mainly responsible for ensuring that the instructional technology infrastructure is functional at all times and that faculty and student technical difficulties are addressed in a timely fashion. Technical specialists typically assist faculty and staff with technical difficulties with software and, in some cases, with hardware if such support is not provided by the information technology department.

Faculty Technology Liaisons. The faculty technology liaison is a faculty member who devotes a portion of his/her time to instructional technology efforts by serving as a mentor to his/her peers and by assisting colleagues with the use of instructional technology. It is best if faculty liaisons are full-time faculty who are provided course release time to serve as the departmental instructional technology team member. These individuals are vital members of instructional technology support teams as well as their respective academic departments.

Development Team. The scope of the institution's development efforts and the level of sophistication of the products developed may require one or more of the following employees: (1) Project manager, (2) Content experts, (3) Web developers, (4) Graphic artists, (5) Editors, (6) Instructional designers, (7) Videographers, and (8) Photographers.

Figure 1. Director of Instructional Technology

Function of the Position: The Director of Instructional Technology is responsible for leading the institution's instructional technology efforts and for serving as liaison on instructional technology initiatives to administrative and academic departments. The Director oversees the planning, coordination, implementation and evaluation of appropriate instructional technologies to enhance teaching and learning. Specifically, the Director leads initiatives in faculty technology skill development and Web-based instruction. The Director of Instructional Technology also serves as a liaison to the executive leadership of the university on instructional technology initiatives.

Principal Duties and Responsibilities:

- Develop and maintain relations and facilitate communications between the Instructional Technology department and academic departments.
- Develop and maintain relations and facilitate communications between academic departments and the Information Technology department.
- Make recommendations on behalf of academic departments to the information technology department on infrastructure needed to support the implementation of instructional technologies.
- Serve as liaison to executive leadership on instructional technology initiatives.
- Insure that current instructional technologies are researched and that appropriate instructional technologies are recommended.
- Insure adequate training and resources for faculty to develop instructional technology skills.
- Solicit and evaluate software/hardware products in the area of instructional technology.
- Promote instructional technology collaborations among faculty.
- Propose and implement appropriate prototype projects to promote the study of innovative uses of instructional technology.
- Insure that the effectiveness of instructional technology prototype projects is evaluated and that needed revisions are implemented.
- Facilitate an ongoing instructional technology vision for the institution.
- Oversee the instructional technology planning process for the institution.
- Stay abreast of emerging instructional technologies and make recommendations on needed updates.
- Make recommendations to academic leaders on policies and faculty issues that promote faculty's acceptance and use of technology.

Special Skills Needed:

- Education: Master's degree in instructional technology or instructional design required; doctorate preferred.
- Experience: At least 5 years teaching in higher education and a demonstrated track record in the use of instructional technology.
- Outstanding ability and vision in the application of instructional technologies.
- Outstanding organizational skills.
- Outstanding interpersonal skills.
- Outstanding oral and written communications skills.

References

Harris, R., and Waterhouse S. (2001). *A 10-Step Guide to Establishing Instructional Technology.* Washington, D.C.: Executive Leadership Foundation.